AMERICA'S LARGEST TEXTILE MONTHLY

COTTON

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Number Seven
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MAY, 1922

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Dallas, and Atlanta, Ga.

"

Quoting A Practical Mill Man

Mr. Frank Crummer, Purchasing Agent of the Aberfoyle Manufacturing Company, Chester, Pa., recently wrote us of the remarkable durability of Hyatt roller bearings in some of their machines, as follows:

"You may be interested to know of an installation of Hyatt roller bearings which shows their durability.

"In 1898 we installed 48 Hyatt roller bearings in a warp drying machine which operated continuously until dismantled in 1916.

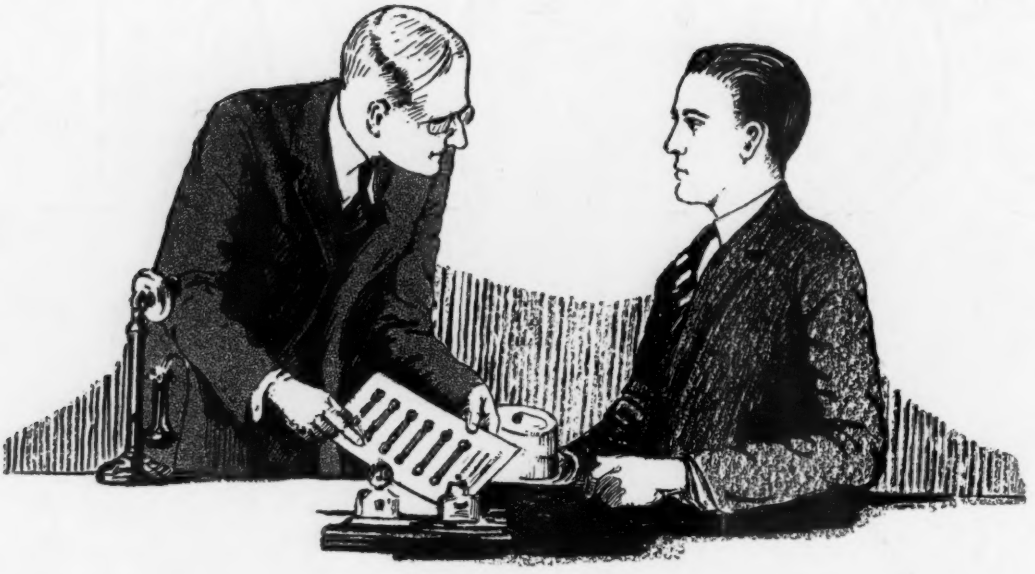
"We found the bearings in first class condition (1916) and having need of some bearings for another job we reinstalled them on yarn reels in our Bleach House where they are giving entire satisfaction at the present time (1922)."

Just think of it—24 years service—18 years in one machine, then 6 years in another and still "giving entire satisfaction"!

Can you longer afford to operate anything but Hyatt equipped textile machinery?

Hyatt Roller Bearing Co.

New York, N. Y.



"If You'll Use These Franklin Colors, I'll Give You an Order for 30,000 Yards Right Now."

Why do converters say such things as this to cotton mill representatives?

Because they have found that colors dyed by the Franklin Process are faster, more brilliant, more solid and better penetrated and, therefore, sell more quickly and give better satisfaction.

We are not saying this as an unsupported statement. We shall be glad to send you our latest color card upon request and let you see for yourself; also a list of the converters who specify our colors.

More and more converters each day are specifying Franklin colors in preference to any others. Have the converters who are **your** customers specified them for any of their goods?

If they haven't yet, they will eventually. As soon as they realize that Franklin colors give them a strong additional selling feature, they will be eager to use them.

Franklin colors can also be used by YOU to good advantage as a feature of **your** selling talk. Tell your trade that you are using or will use Franklin Dyed Yarns and you will find that you have mentioned a point of particular interest to them.

Then send your next batch of yarn to our nearest plant to be dyed. Send it on cones, packages or parallel tubes and we will return it to you on parallel tubes all ready for the V creel.

If you haven't one of our color cards and prices, write today.

FRANKLIN PROCESS CO.

Philadelphia Greenville, S. C. Manchester, Eng.

PROVIDENCE, R. I., U. S. A.

Job Dye Houses in All Four Cities

MIRROR DROP WIRES

TRADE-MARK REG. U. S. PAT. OFF.

Having greatly improved the finish of our Northrop Loom Drop Wires

we have adopted the trade-mark

MIRROR

to identify the drop wires of our manufacture and each shipment will contain a slip bearing this trade-mark

Although our prices for drop wires are higher than others that may be purchased, the superior finish of our drop wires makes them worth much more than the difference in price

IT DOES NOT PAY to polish the eyes of drop wires with the warp yarns, after reaching the loom

It takes too long and warps are too expensive

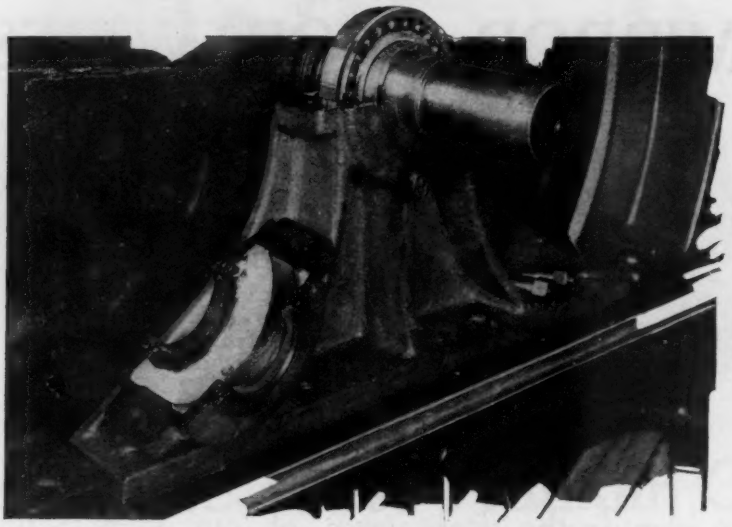
DRAPER CORPORATION

HOPEDALE MASSACHUSETTS

Atlanta Georgia

Copyright 1917 by Draper Corporation

SKF



Ball Bearings Maintain Proper Card Setting Despite Belt Pull

THE weight of the main cylinder of a cotton card soon causes wear in the lower half of a plain-bearing bushing and this wear extends up the drive side of the bearing, showing that belt pull plays an important part in producing it. If the card is set in the easiest way—that is with the belts off—this wear causes an entire change in the fine setting when the machine is started—and consequent impairment of the work. It also permits the cylinder to cock, endangering the clothing when running; also causing uneven finish when grinding the wires.

Cards equipped with **SKF** marked self-aligning ball bearings are practically wearproof—once a setting is made it is *maintained* accurately in every day operation. Added to this is the fact that considerable power is saved, starting is made easy, lubrication bills decreased fully 80% and the life of the card clothing is increased. Many mills are not only lessening their power problem but are greatly bettering the quality and increasing the quantity of their output by using ball-bearing equipped cards.

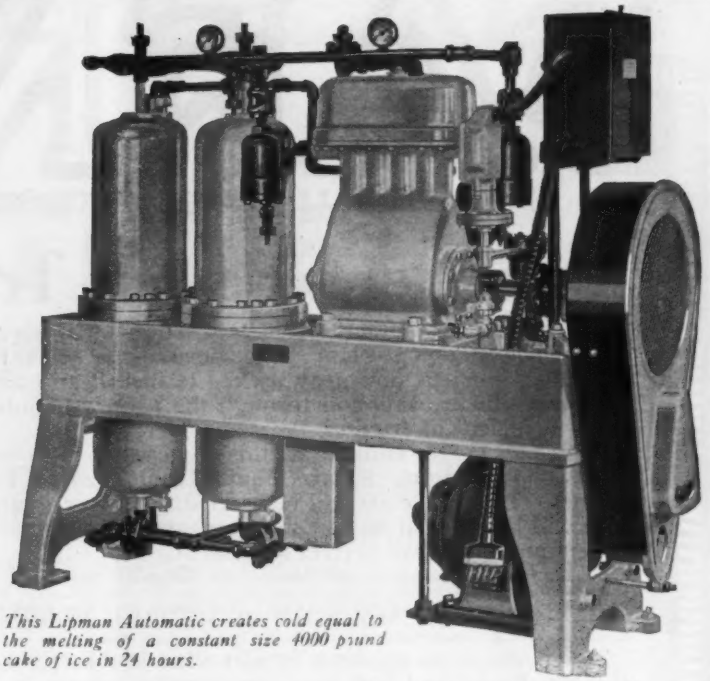
Write to our engineering department for further information.

THE SKAYEF BALL BEARING COMPANY

Supervised by SKF INDUSTRIES, INC., 165 Broadway, New York City

742

Here's a machine that will pay for itself this summer!



This Lipman Automatic creates cold equal to the melting of a constant size 4000 pound cake of ice in 24 hours.

ICE is of course a necessity during the summer months for cooling drinking water. It is also a big item of expense, not only for ice itself but for labor costs in handling, crushing, cleaning tanks, etc.

Why continue this expense when it is not necessary and when you can cool your drinking water in a more sanitary way and at a cost that is negligible?

The Lipman Automatic Refrigerating machine will cut out your ice bills and labor charges for handling ice, pay for itself this summer, and pay dividends for years to come.

This machine furnishes a constant supply of sparkling cold water automatically. Just set it at the desired temperature and forget it. No attention is required other than an occasional oiling. It freezes ice also and has many other novel uses. The operating cost is negligible as it uses very little current.

Lipman Automatics are now being used in a number of textile mills and are giving complete satisfaction in every installation. They are installed on a money-back guarantee.

Without obligating you in any way, we'll be glad to send a refrigerating engineer to investigate your need for cold water and ice and give you exact figures on an installation to exactly suit your particular mill. If a Lipman will not be an investment for you, he will tell you so.

Ask for full information and list of mills using Lipman's

THE MILES REFRIGERATING COMPANY
292 PEACHTREE, ATLANTA, GA.

Lipman

FULL-AUTOMATIC REFRIGERATING MACHINES

FAFNIR

DOUBLE BALL BEARING TRANSMISSION BOXES

Efficient Power Transmission

We wonder whether you have given as much serious consideration to the transmission of power in your plant as you have to the generation of that power? Many people have not—yet it is obviously useless to install an efficient power plant and then waste the power in transmission through the agency of inferior line shaft bearings having a high coefficient of friction.

Your best bet for eliminating this great waste is to remove your present plain bearing boxes and substitute **Fafnir Double Ball Bearing Hanger Boxes** in the same hanger frames. Then all loads will be carried by Fafnir quality alloy steel ball bearings; friction will be reduced to the minimum; wear eliminated, and the lines of shafting permanently maintained in perfect alignment.

In examining the cut-away section shown in the photograph, we ask you to note particularly the driving collar which is one of the many exclusive features of the **Fafnir** Double Ball Bearing Hanger Box. One of these collars is firmly mounted on the shaft at each end of the box. The collars have lugs which mesh with corresponding slots in the wide inner rings of the ball bearings. Thus the ball bearing inner rings are positively driven and cannot slip on the shaft. Furthermore, the collars transmit thrust loads to the ball bearings which carry all loads with minimum friction.

We solicit an opportunity of telling you more about **Fafnir Double Ball Bearing Hanger Boxes** and how they can save you money in power transmission.

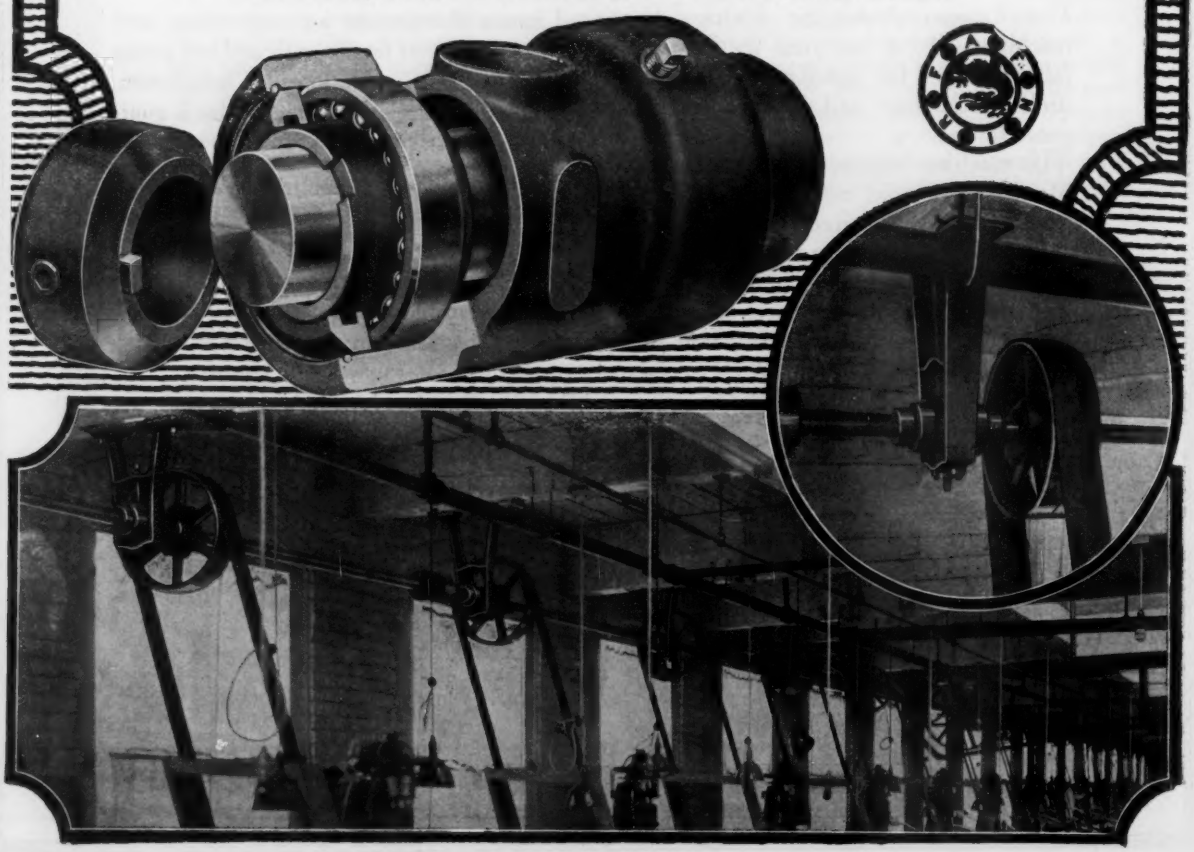
The scene below was photographed in the plant of the W. H. McElwain Company at Nassau, N. H., where **Fafnir Double Ball Bearing Hanger Boxes** were installed in their original hangers.

THE FAFNIR BEARING COMPANY

Conrad Patent Licensee

New Britain, Conn.

Southern Representative, O. R. S. Pool, P. O. Box 1375, Greenville, S. C.



SOFTENERS

TIME-TESTED

EXCELSIOR COTTON SOFTENER—is an oil product unexcelled as a softener in size on warps, in print paste or in "pure" finishing. It contains no starch, loading materials, strong chemicals or mineral oil products. A very penetrating softener and one of our oldest and most extensively used formulas.

EXCELSIOR COCOANUT OIL EMULSION—with the decidedly greater power of Cocoanut Oil to soften and with its high degree of oil concentration, one pound of Excelsior Cocoanut Oil Emulsion will do the work of two pounds of an ordinary softener.

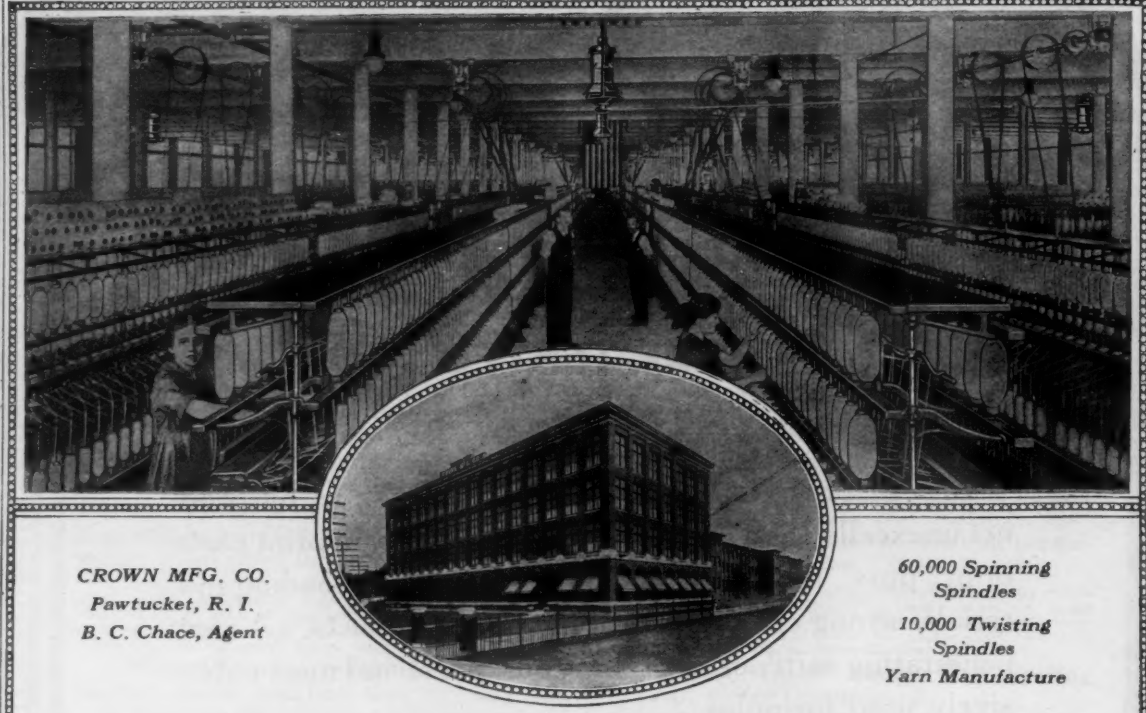
EXCELSIOR TALLOW SOFTENER—a perfectly emulsified prime white tallow, properly combined with ingredients that insure even application, efficient softening, safety and economy.

THE PURE OIL CO.

THE MOORE OIL REFINING CO. DIVISION

CINCINNATI, OHIO

The Moore Oil Refining Co. Cincinnati, O.



CROWN MFG. CO.
Pawtucket, R. I.
B. C. Chace, Agent

60,000 Spinning Spindles
10,000 Twisting Spindles
Yarn Manufacture

Clean Mills—Humidifiers—and Profits are Partners

Somewhere in the United States may be a cleaner cotton mill than the Crown Manufacturing Company, Pawtucket, Rhode Island, but I never have happened to see it. Cleanliness here is capitalized. Aside from the usual methods, this mill has ParkSpray High Duty Humidifiers.

What have ParkSpray High Duty Humidifiers to do with cleanliness? Each one of them circulates and cleanses over one hundred thousand cubic feet of air each hour. Each ParkSpray High Duty Humidifier is a miniature air-washer.

ParkSpray High Duty Humidifiers with regulation add the equivalent of two weeks to a mill's production. Spotless cleanliness will easily add the equivalent of two weeks more.

Fifty-six weeks in a year—instead of fifty-two.

With a real scientific approach to an industrial humidifying problem, humidifiers aid in cleanliness by reducing fly and static electricity. Lack of cleanliness is waste. Clean Mills—Humidifiers—and Profits are partners.

Profit by High Duty Climate

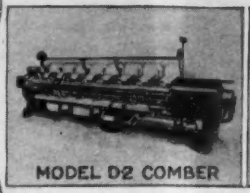
Parks-Cramer Company
Engineers & Contractors
Industrial Piping and Air Conditioning
Fitchburg Boston Charlotte

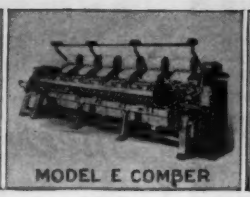
WHITIN MACHINE WORKS

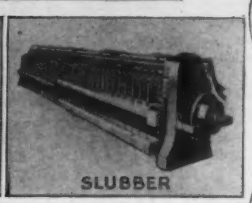
ESTABLISHED 1831

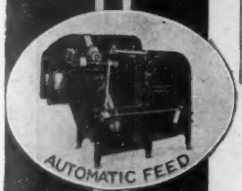
TEXTILE MACHINERY

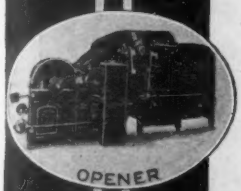
MAIN OFFICE AND WORKS, WHITINSVILLE, MASS., U.S.A.











Manufacturers of

COMPLETE EQUIPMENTS

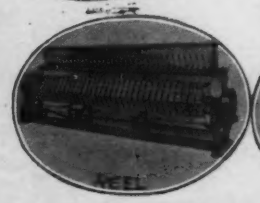
FOR MAKING

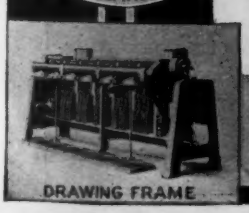
YARNS

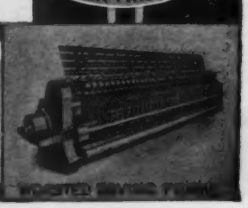
from

COTTON, COTTON WASTE
WOOL, ASBESTOS, Etc.

Descriptive Catalogs on Request







STAFFORD

AUTOMATIC LOOMS

For Wide Sheetings

The Stafford broad loom is built to withstand severe service. Its simplicity, accessibility of parts and ease of operation are a few reasons why it is used by some of the most representative wide goods mills.

This loom embodies the high weaving qualities that characterize other Stafford looms and it can now be supplied with either shuttle or bobbin changing automatic features.

THE STAFFORD COMPANY

READVILLE, MASS.

Southern Agent, J. H. MAYES, Charlotte, N. C.

PLANT OF THE STAFFORD COMPANY, READVILLE, MASS.

180,000 Miles a Second!

Instead of 60 Miles a Day!

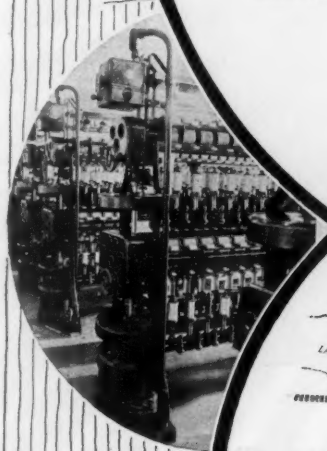
The United States Geological Survey reports that "In the year 1930 the proposed Super-power System would save for the 96,000 manufacturing establishments within the Super-power Zone, $190,000,000 annually, above the fixed annual charges, against a capital investment of $185,000,000 to provide for the motor equipment necessary to receive and use the power."

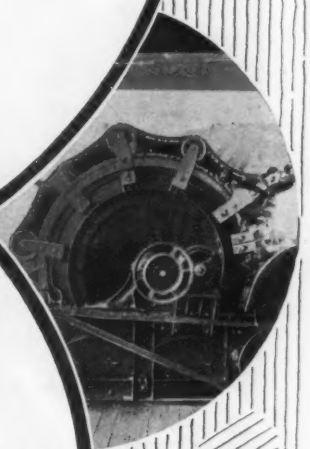
Startling things are happening today! Who can say that the time is not near at hand when it will be considered absurd to haul coal by rail 50 or 60 miles a day when great power stations can be located at the source of fuel supply and electric energy transmitted 180,000 miles a second by wire? This means cheaper power for you.

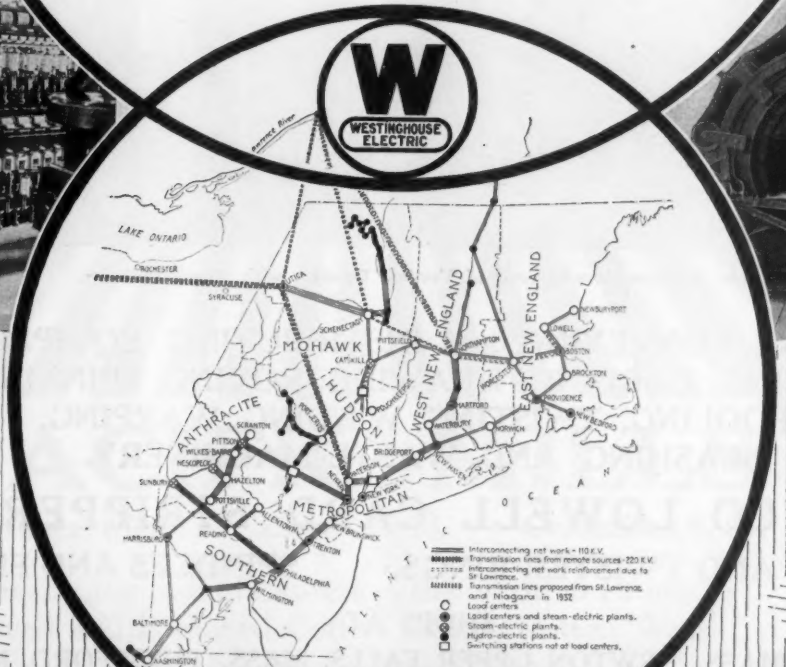
Two new Westinghouse developments—individual motor drive for silk spinners and for cards, has brought the textile industry to the threshold of complete electrification, through which economy in its broadest sense, may be obtained.

Plan your improvements so that you will fit into the broad scheme of electrical development ahead, and thus secure all its benefits.

Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pa.
Sales Offices in All Principal American Cities.







POSSIBLE POSITIONS OF PRINCIPAL PLANTS and TRANSMISSION LINES IN 1930

Westinghouse

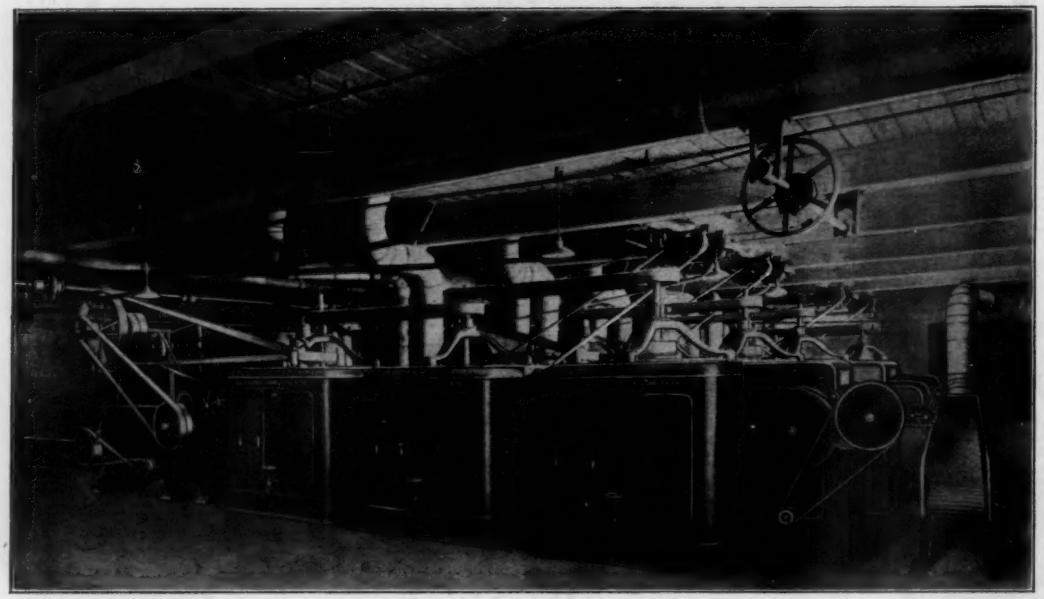
SACO-LOWELL SHOPS

Textile Machinery

—INCLUDING—

Modern Equipment for Thoroughly Opening and Mixing Baled Cotton

So Essential if a High-Class Product is to be manufactured



Triple, Tandem Arrangement of Vertical Openers with Apron Delivery.

OPENING, CONVEYING and DISTRIBUTING EQUIPMENT
PICKING, CARDING, DRAWING, ROVING, SPINNING,
SPOOLING, TWISTING, WINDING, WARPING,
SLASHING AND WASTE MACHINERY.

SACO-LOWELL CARD STRIPPER

SPINNING AND TWISTER RINGS, SPINDLES AND FLYERS.

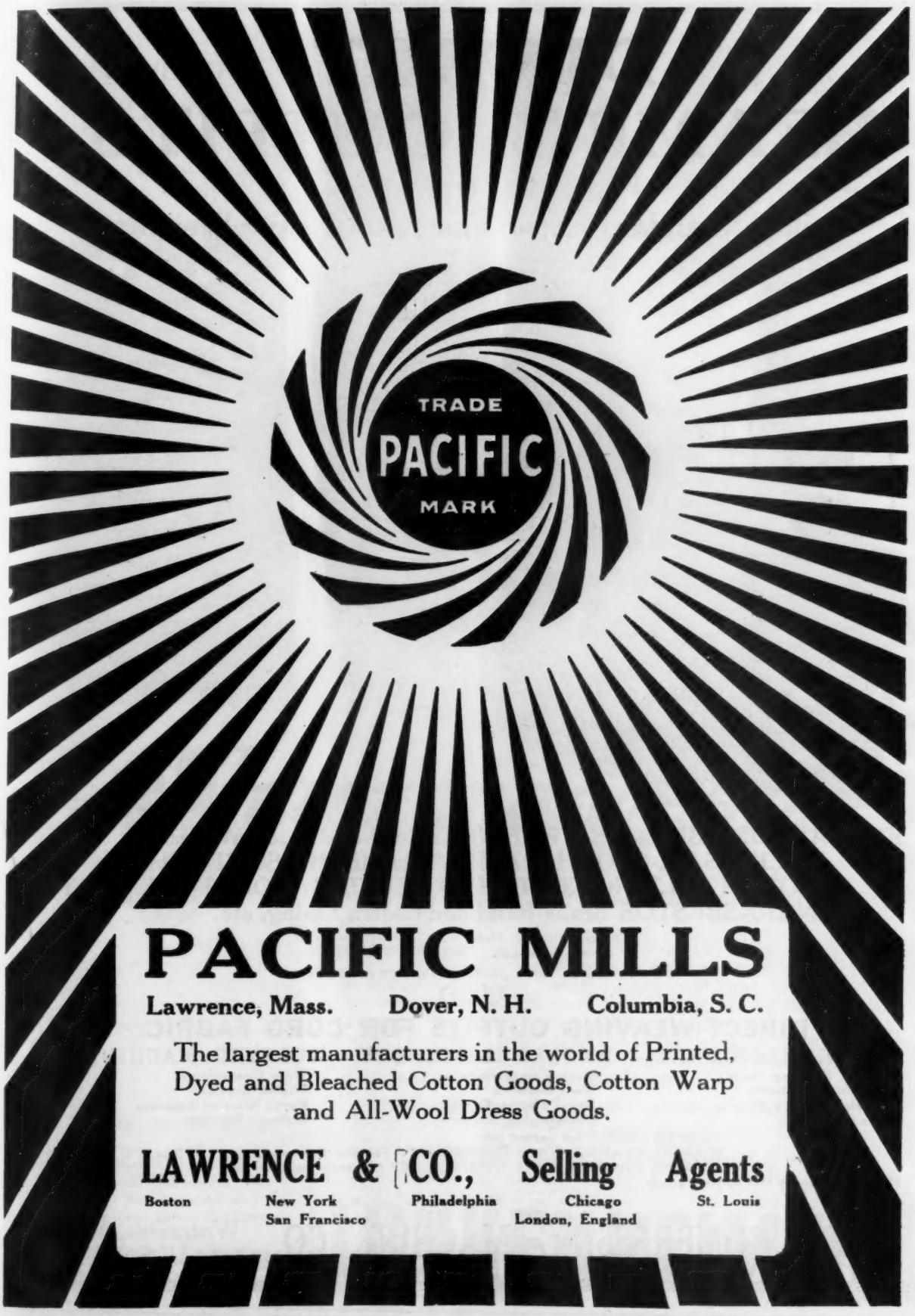
SHOPS AT

LOWELL, MASS., NEWTON UPPER FALLS, MASS., BIDDEFORD, MAINE
PAWTUCKET SPINNING RING CO., CENTRAL FALLS, R. I.

EXECUTIVE OFFICES, BOSTON, MASS.

ROGERS W. DAVIS, Southern Agent, Charlotte, N. C.

Southern Branch Office, Greenville, S. C.



PACIFIC MILLS

Lawrence, Mass. Dover, N. H. Columbia, S. C.

The largest manufacturers in the world of Printed, Dyed and Bleached Cotton Goods, Cotton Warp and All-Wool Dress Goods.

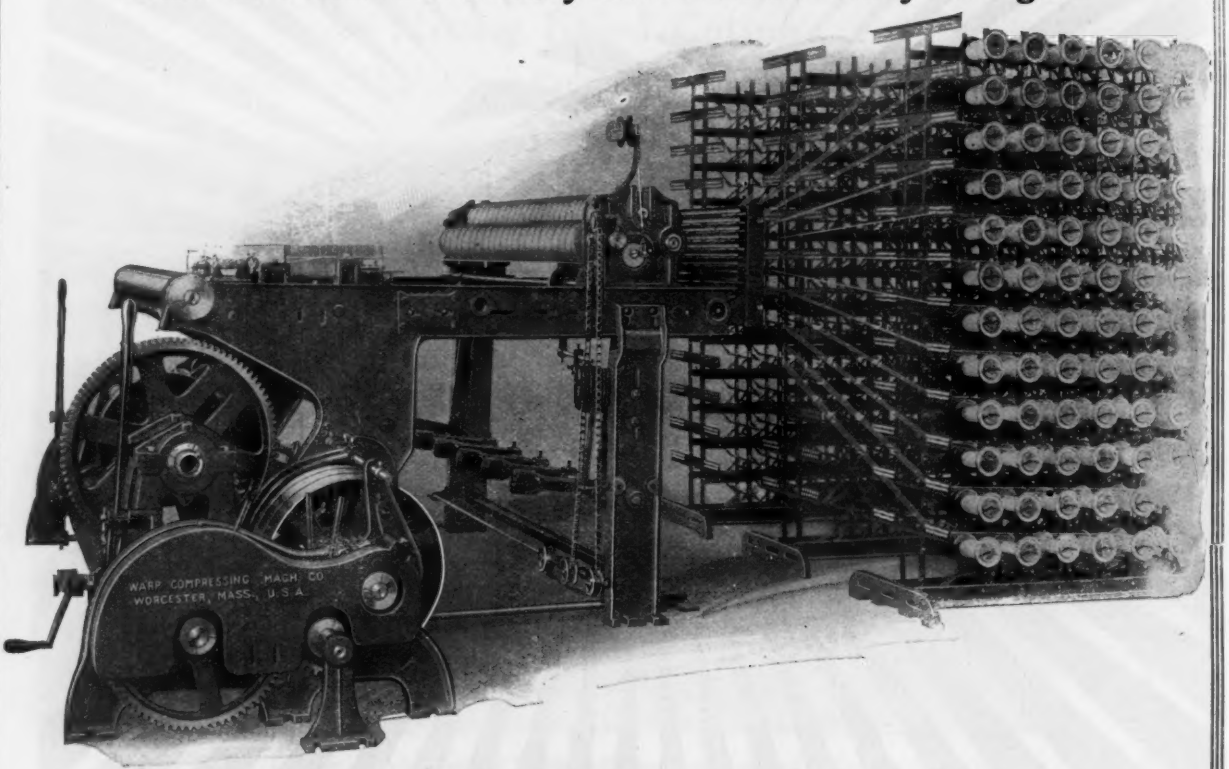
LAWRENCE & CO., Selling Agents

Boston New York San Francisco Philadelphia Chicago London, England St. Louis

DIRECT BEAMING OUTFITS

FOR PLIED YARNS

Built in Standard Heavy and Extra-Heavy Weights



For:—AUTOMOBILE TIRE FABRICS: Cord and Duck Warps. DUCKS: SAIL-CLOTH: CAMEL'S HAIR PRESS CLOTH: WOVEN BELTING: STITCHED BELTING: CONVEYOR BELTING: ASBESTOS Brake-Band and Clutch Lining, etc.

Beaming directly from your twister spools or cheese packages. UNIFORM TENSIONS

30 to 50 per cent. more yarn per loom beam

ALSO

DIRECT-WEAVING OUTFITS FOR CORD FABRIC

COTTON MACHINERY	WOOLEN MACHINERY	WORSTED MACHINERY
Direct Beaming Outfits	Warp Compressors	Warp Compressors
Dry Slasher Outfits	Wool Beamers	Duplex Beamers
Chain Beaming Outfits	Dry Dressing Outfits	Royal Worsted Spoolers
Warper Creels	Compressing Spoolers	Multiple Spoolers

WARPER CREELS for carpet jute
BEAMING HEADS & WARP COMPRESSORS for jute slashers
BEAMING HEADS & WARP COMPRESSORS for papermakers felts.

Highest efficiency test in your goods. Production plus Quality.

Representative: F. W. Kiessling, Worcester, Mass.

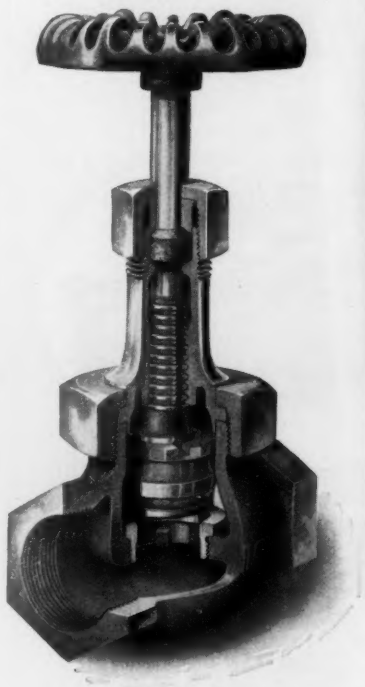
WARP COMPRESSING MACHINE CO., Worcester, Mass. U. S. A.

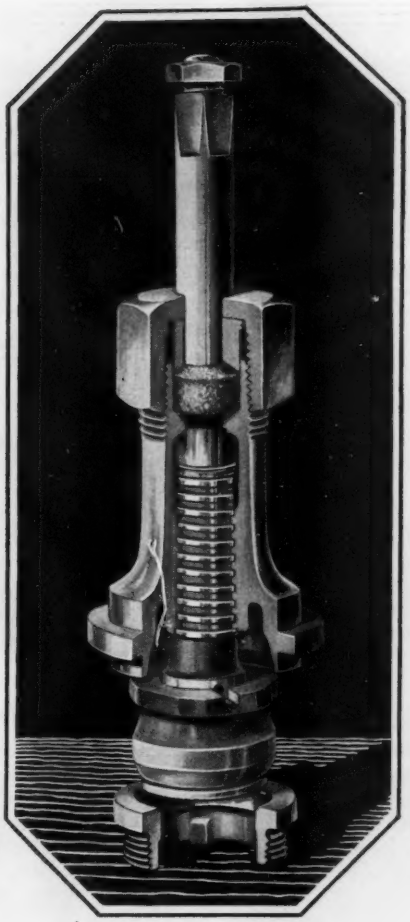
"RENEWO"

(Bronze Body)

Fig. 73, Medium Pattern for 200 lbs. W. S. P.

Fig. 16, Extra Heavy for 300 lbs.

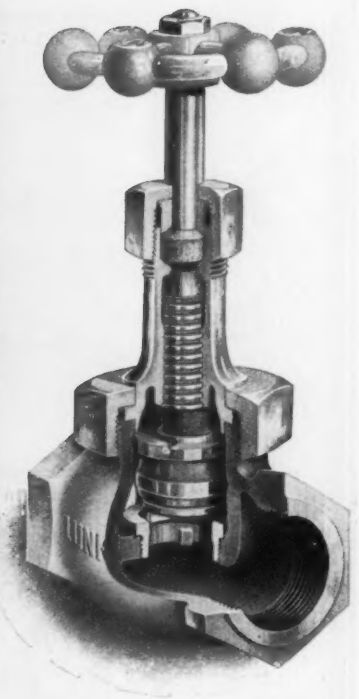




"FERRENEWO"

(Ferrous Body)

Fig. 1021 for pressures up to 150 pounds.



Interchangeable

and renewable as well, and this applies to all wearing or bearing parts of Lunkenheimer "Renewo" and "Ferrenewo" valves.

Standardization throughout a plant, with its resultant economies is easily accomplished with the "Renewo-Ferrenewo" combination,—"Renewo" Valves for the high pressure lines and "Ferrenewo" for the low pressure lines, with only one set of repair parts necessary to meet any emergency. Both types also embody the well known Lunkenheimer Regrinding seat feature.

Familiarize yourself with the manifold advantages of the "Renewo-Ferrenewo" combination. It pays.

Descriptive literature sent on request.

"America's Best since 1862"

THE LUNKENHEIMER CO.
"QUALITY"

Largest Manufacturers of High Grade Engineering Specialties in the World

NEW YORK CHICAGO **CINCINNATI, U. S. A.** BOSTON LONDON

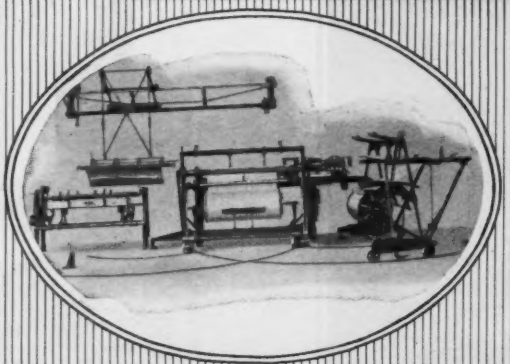
Export Dept. 129-135 Lafayette St., New York

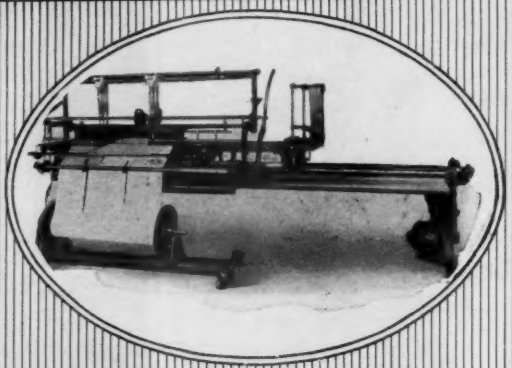
LUNKENHEIMER

102-25 10

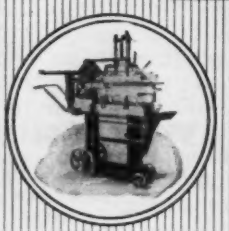
BARBER-COLMAN

WARP TYING & WARP DRAWING MACHINES
HAND KNOTTERS





THE HOME OF BARBER-COLMAN
PRODUCTS VIEWED FROM AN AIRPLANE

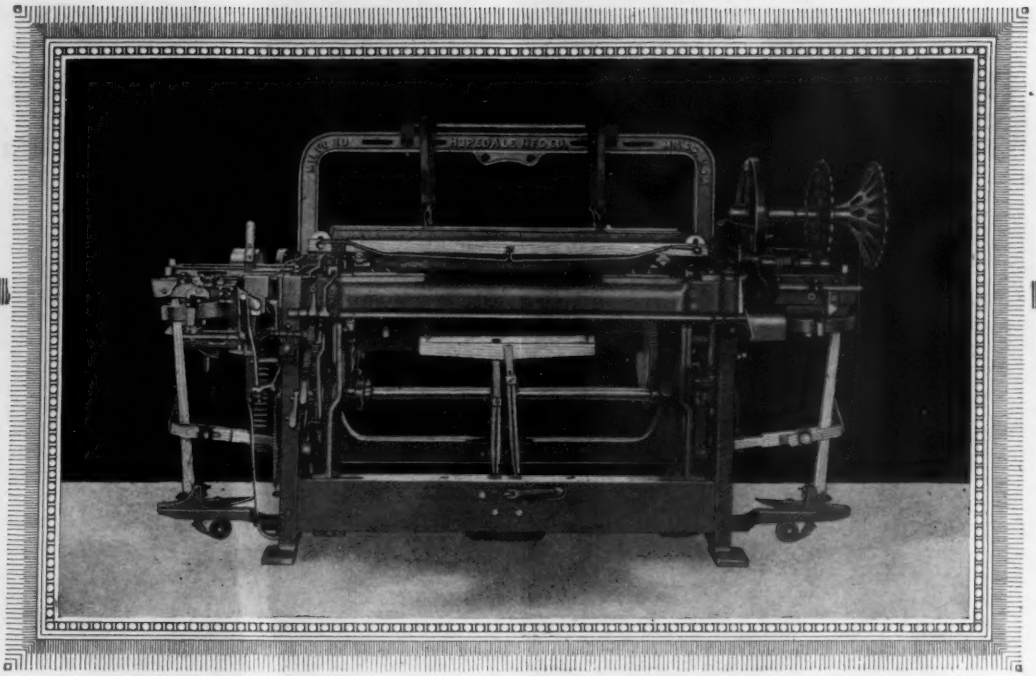


BARBER-COLMAN COMPANY

BRANCH
BOSTON, MASS.

HOME OFFICE & PLANT
ROCKFORD, ILL., U. S. A.

BRANCH
GREENVILLE, S.C.



New Nordray Loom

IT IS OUR POLICY TO ADOPT IMPROVEMENTS WHENEVER POSSIBLE.

THOUGH ONLY THREE YEARS OLD, THIS LOOM HAS MANY IMPORTANT CHANGES.

BUILT BY LOOM BUILDERS

HOPEDALE MFG. CO.

MILFORD, MASS.

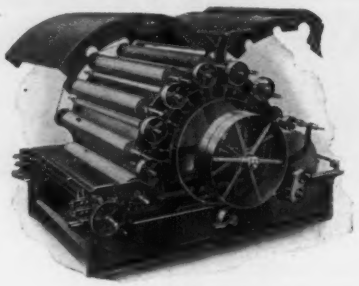
SMITH & FURBUSH MACHINE CO.

PHILADELPHIA

Specialists in machinery for various kinds of WASTES. Builders of Carding and Spinning Machinery for Wool, Asbestos, Cotton-waste and other yarns spun on the wool principle.

Garnetts and Shoddy Machinery. Batt or Felting Machinery, Machinery for wiping and car-box waste.

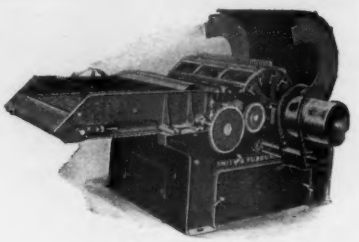
Complete equipments for Rewoven Gunny.



Cotton Waste Card

Ask for Circular S-165

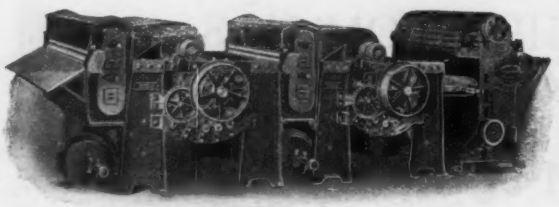
This is one of the carding units in a plant for making mop, cordage or other yarns from cotton waste.



Jute Picker

Circular S-166

This machine is used for opening Gunny and Burlap, forming a part of our equipment for the manufacture of Rewoven Gunny Bagging.

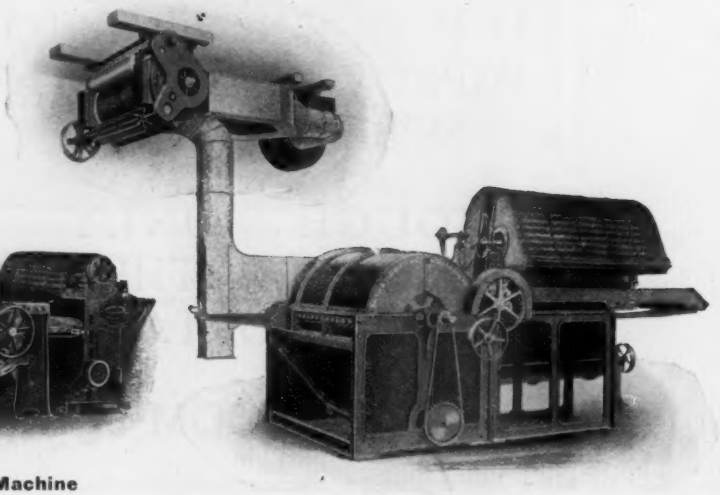


Cotton Waste Reclaiming Machine

(Shaughnessy Patent)

Ask for Circular S-90

The Shaughnessy Reclaimer does work not done by any other machine in recovering spinning fiber from low grade Cotton Wastes.

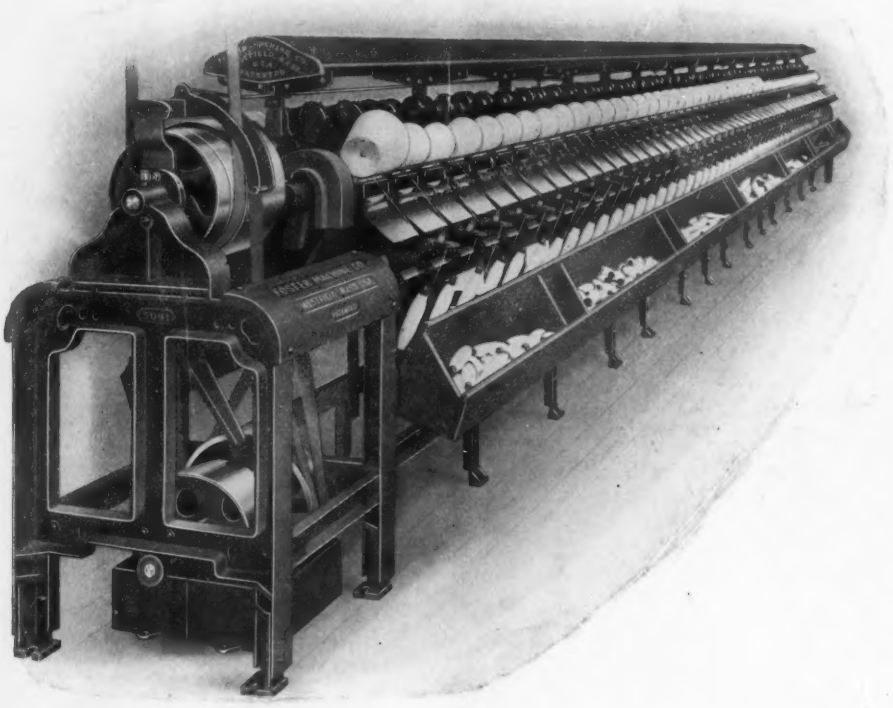


Continuous Outfit For Cotton Waste

Ask for Circular S-185

Our continuous outfit removes the loose dirt, dust and bits of iron, wood, etc., from low grade Cotton Waste.

CONE WINDING



MODEL THIRTY CONE WINDER

Cotton Knitting Yarn—FOSTER WOUND—will have that most essential Knitting quality—Free, even unwinding from the Cone in the Knitting process.

Foster Model Thirty Finishing is recommended for two ply mercerized or Single mercerized yarn that requires delicate handling.

FOSTER MACHINE COMPANY

WESTFIELD, MASS.

John Hill, Southern Representative, Healy Bldg., Atlanta, Ga.

THE ROCKER JOINT SILENT CHAIN WI

MORSE

Flexible as a Belt

On Spinning Fra

RUN COOL, OIL BATHS NOT REQUIRED

OPERATES QUIETLY

GUIDE LINKS HOLD CHAIN ON LINE

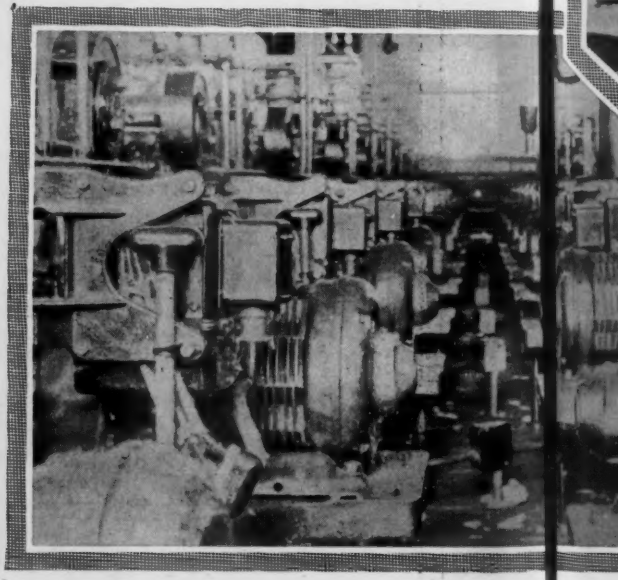
BETTER PLA LAYOUT

UNIFORM SPEED INCREASING PRODUCTION

BETTER LIGHTING

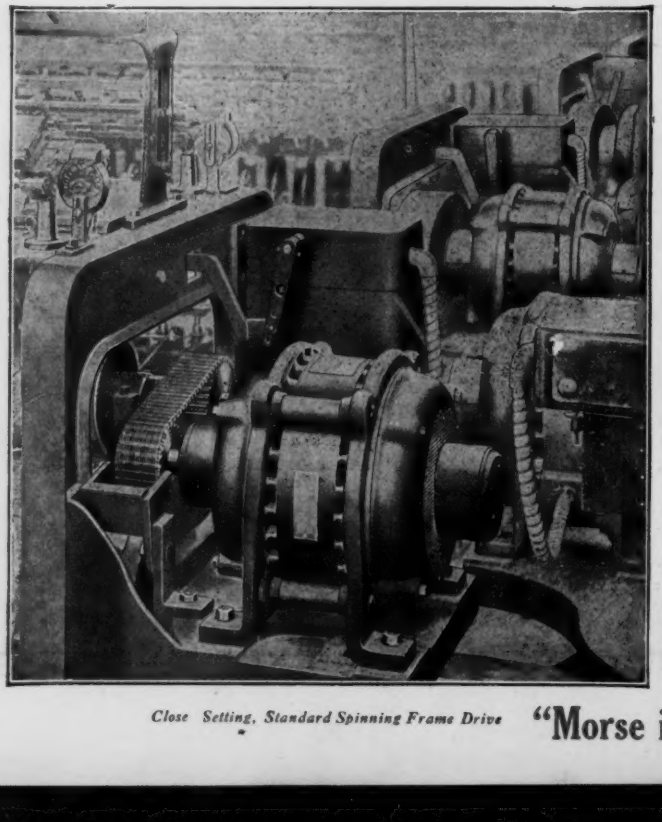
ANY REDUCTION IN SPEED IS POSSIBLE

Changing over Saxon Mills, Spartanburg, S. C. J. E. Sirrine, Mill Engineers and Architects.



Lynchburg Cotton Mill Co., Lynchburg, Va. Lockwood,

SAVE Construction, Space, Light, Fuel, Produ
Engineers Planning Power Transmissions Secure
"MORSE" Dri s.



Close Setting, Standard Spinning Frame Drive

MORSE CHAIN CO., LARGEST M UFACTURER SILENT CH IN THE W

MORSE ENGINEERING SERVICE

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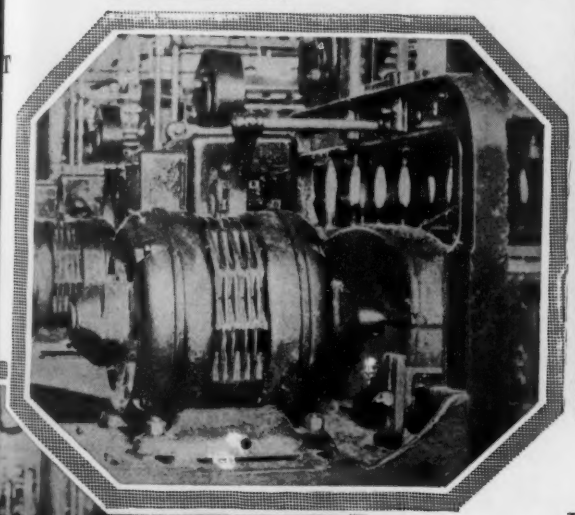
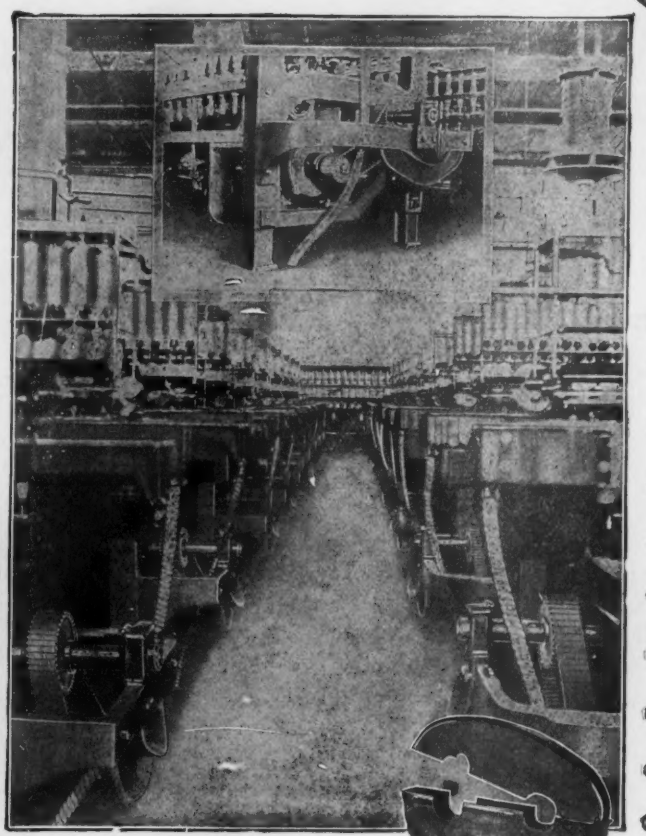
Positive as Gears

Frame Drives

SMOOTH RUNNING
IMPROVING QUALITY
POSITIVE
SPEED RATIOS





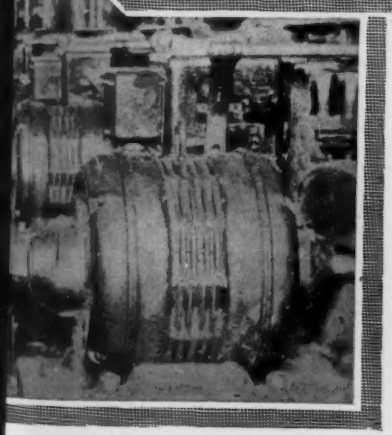
Underhung Motor Spinning Frame Drive.

Drawn Steel Chain Case

DURABLE **WITHOUT SLIP**

FREEDOM FROM OVERHEAD CONSTRUCTION

CLEANLINESS — CONGENIAL WORKING SURROUNDINGS



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Secure Data and Estimates of
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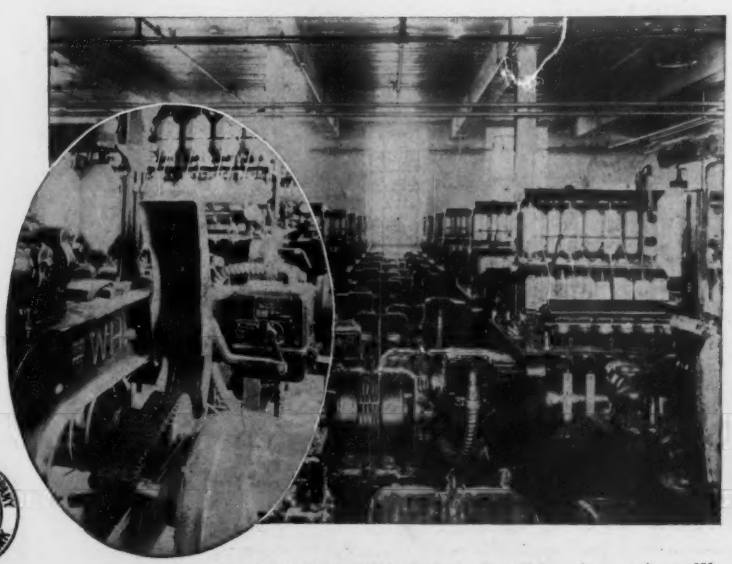
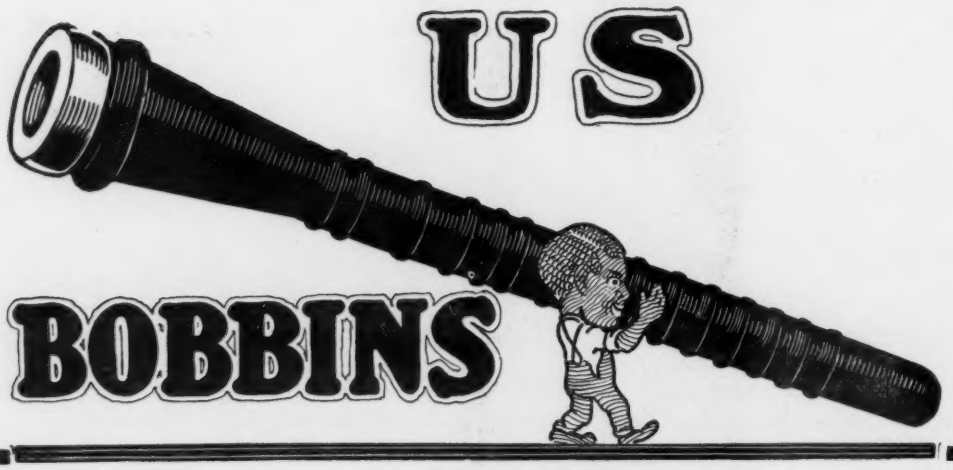
MORSE CHAIN COMPANY ITHACA NEW YORK



This Rhode Island mill, "MORSE" equipped. One 450 h.p. drive and one 275 h.p. drive to 320 K. W. and 200 K. W. Generators. Three 10 h.p. drives and Six 15 h.p. drives connecting motors to line shafts. Three hundred and Seventy-Five drives connecting 5 h.p. and 7 1-2 h.p. individual motors to Spinning Frames.

Efficiency, Durability and Service"
tion—Philadelphia, May 22nd-27th



U S BOBBINS are made right, by men with long experience and knowledge as to just what the highest-class mills desire. They are stronger, lighter, and absolutely smooth and true. Our new system of testing every Bobbin on your own spindles eliminates any that do not run true.

The "STETSON" Hand-Threading Shuttle is another one of the famous U S products. This is the best exponent of the hand threading type of shuttle that has ever been presented to the textile trade. You have only to try them to be convinced of their superiority.

We also make shuttles for Draper, Stafford and Crompton & Knowles Looms, and will be glad to furnish samples upon request.

We make a specialty of rolls, especially for the Universal and Foster Winders; also Underclearer Rolls, Plain and covered, Comber Rolls, Drawing Rolls, etc.

Every one of the U S Products have quality of the highest character, and they are saving hundreds of mills time and money wasted by frequent changing and purchasing.

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- Drawing
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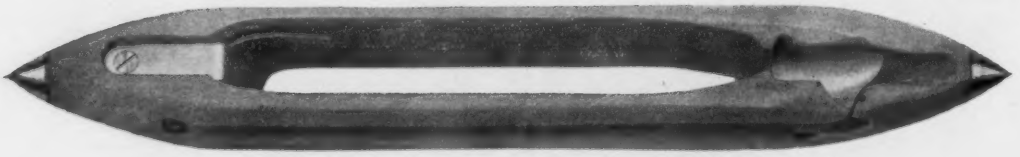
- Twister
- Jack
- Silk
- Belting

BEAMS
- Rubber
- Cotton

SPEEDERS
SKEWERS
WARP FILLING
CAP SPINNING
FLAX SPINNING
TWISTERS
TRIPTODS
QUILLS
ROLLS
- Comber
- Underclearer
- Drawing
- Winder



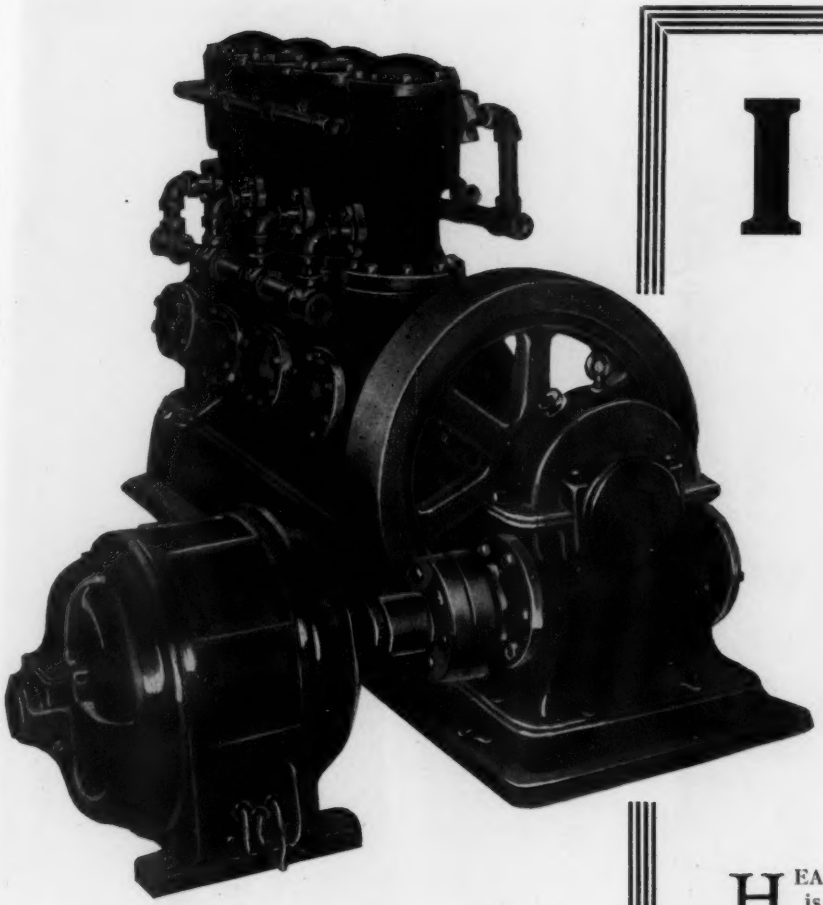
Our New "S" Automatic Shuttle
Most Successful Automatic Shuttle on the Market.

U S BOBBIN & SHUTTLE CO.

PROVIDENCE, R. I.

LARGEST BOBBIN AND SHUTTLE MANUFACTURERS IN THE WORLD

EIGHT FACTORIES



ICE

or a refrigerated room has become one of the necessities of life and health in the mill and mill village.

HEALTH and efficiency of operatives is an important essential to productive mill operation as every manufacturer knows.

Pure foods and the conservation of it, plenty of cool, pure water—plenty of ice for the mill people's refrigerators—and for community hospitals, stores, etc., has become absolutely essential for health and efficiency throughout any community.

Your ice costs can be cut down considerably and you can supply your operatives with ice at a good profit to you and a saving to them by installing a small "Southern" ice making equipment right in your own mill or village. The cost of installation will surprise you—the cost of operation is very small—the system is so simple, compact, efficient and durable that maintenance costs are negligible.

This equipment has paid for itself in scores of mill installations. Let us tell you what it will cost you for your particular mill conditions. Survey without charge or obligation.

Ask for interesting literature.

Southern

ICE MACHINES AND REFRIGERATING EQUIPMENT

One to Six Ton Capacities

Southern Ice Machine Co.

CHARLOTTE, N. C.

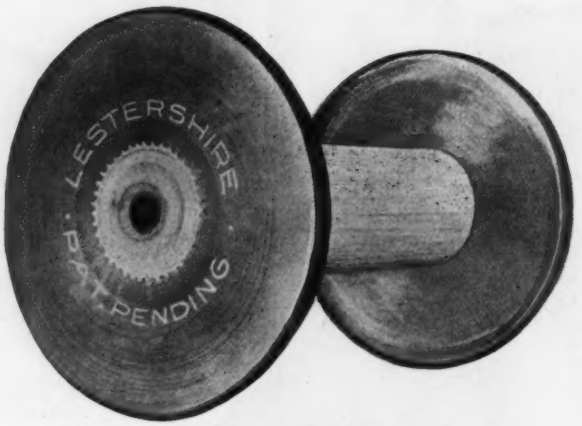


FIG. 2. LESTERSHIRE FIBRE HEAD SPOOL

"The Everlasting Spool"

The "Lestershire Type" Patented Vulcanized Fibre Head Spools are acknowledged by those who have used them, to be the most practical and economical spools on the market for regular mill use.

A knowledge of the construction will convince you that this spool has been designed to give the greatest satisfaction for whatever purpose it is used.

"Lestershire Type"' Spool Heads are made from vulcanized hard fibre (the material from which such articles as gears and end thrust bearings are made). This is flexible enough to bend under strain; practically unbreakable, never warps or twists out of shape, yet so hard that the best tool steel will not readily machine it. Diamond pointed tools are used.

The heads are held securely in position with dogwood bushings and are locked in the barrel so that they cannot burn. This method of securing the heads is the patented feature of all "Lestershire Type" Spools.

By actual tests, these spools will increase your creeling production at least 50% over any other type spool.

The dogwood bushings used make the spindle bearings last many times longer than ordinary wood bushings.

Vulcanized fibre spools are not new. In the silk industry where they have been in use for fully twenty years, practically no other type is used for the reason that this kind of fibre is almost unbreakable and will not wear rough.

With our improved method of fastening the heads to the barrel, it is just as applicable in other branches of the textile industry.

This is why **"Lestershire Everlasting"** spools are recognized as more than mere supplies that are soon worn out and thrown away. The up-to-date mill man knows that their long life makes them **permanent fixtures** of the mill.

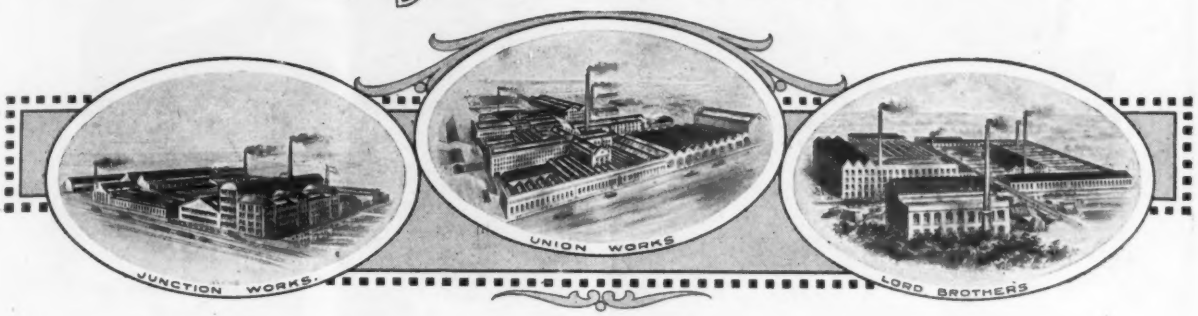
Mail us a sample of your spool and we will quote price for duplicating same in our Patented Everlasting Fibre Spool.

Lestershire Spool & Mfg. Co.

Johnson City, N. Y.

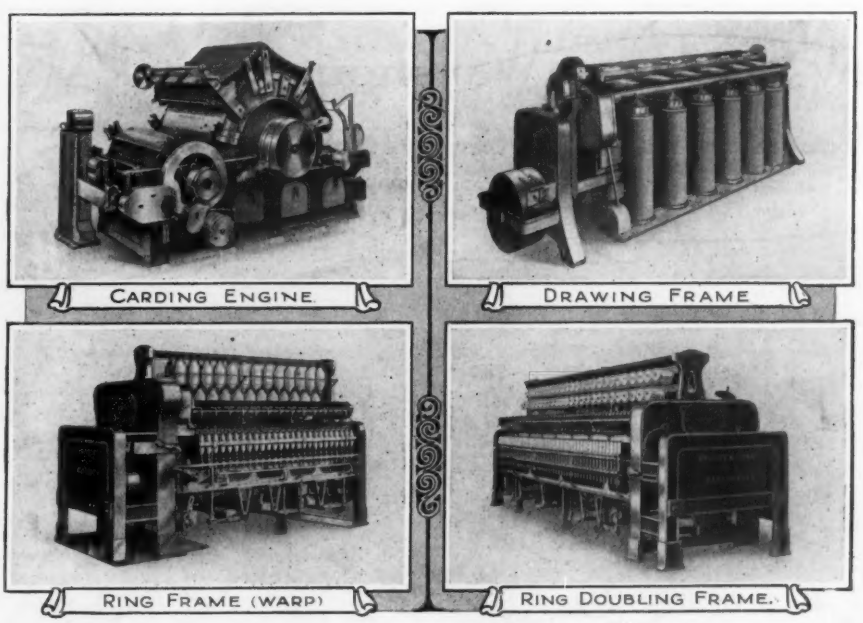
Manufacturers of Spools and Bobbins of Every Description

BROOKS & DOXEY
(1920) LIMITED



TEXTILE MACHINERY MAKERS
for the Cotton, Cotton Waste, Wool, and Silk Trades.

60 years' experience and our reputation for the highest class of Textile Engineering are at the back of every machine we build. Some of the finest and most efficient mills in the world have been equipped by us.



Address Letters: P. O. Box 34, Manchester. Codes: A B C 5th Ed., Lieber's, Bentley's, A1 and Western Union (Universal) Telegrams: "UNION, MANCHESTER."

HEAD OFFICE:- UNION IRON WORKS, WEST GORTON, MANCHESTER, ENG.

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Napper Roll Grinder

Why Do Leading Mills Use Roy Grinders?

For many years the leading textile mills of the United States and many foreign countries have been using Roy Grinders because they not only prolong the lives of Cards, Nappers, Garnetts, and Calender Rolls, but they enable these machines to give satisfactory srevice not merely for the first week or month but year after year.

What a man says about a machine carries weight; but—the fact that he uses it carries more weight, and the fact that Roy Grinders are used almost universally throughout the textile industry offers more convincing evidence of their value than thousands of mere "opinions."

Write for full details of Roy Grinders

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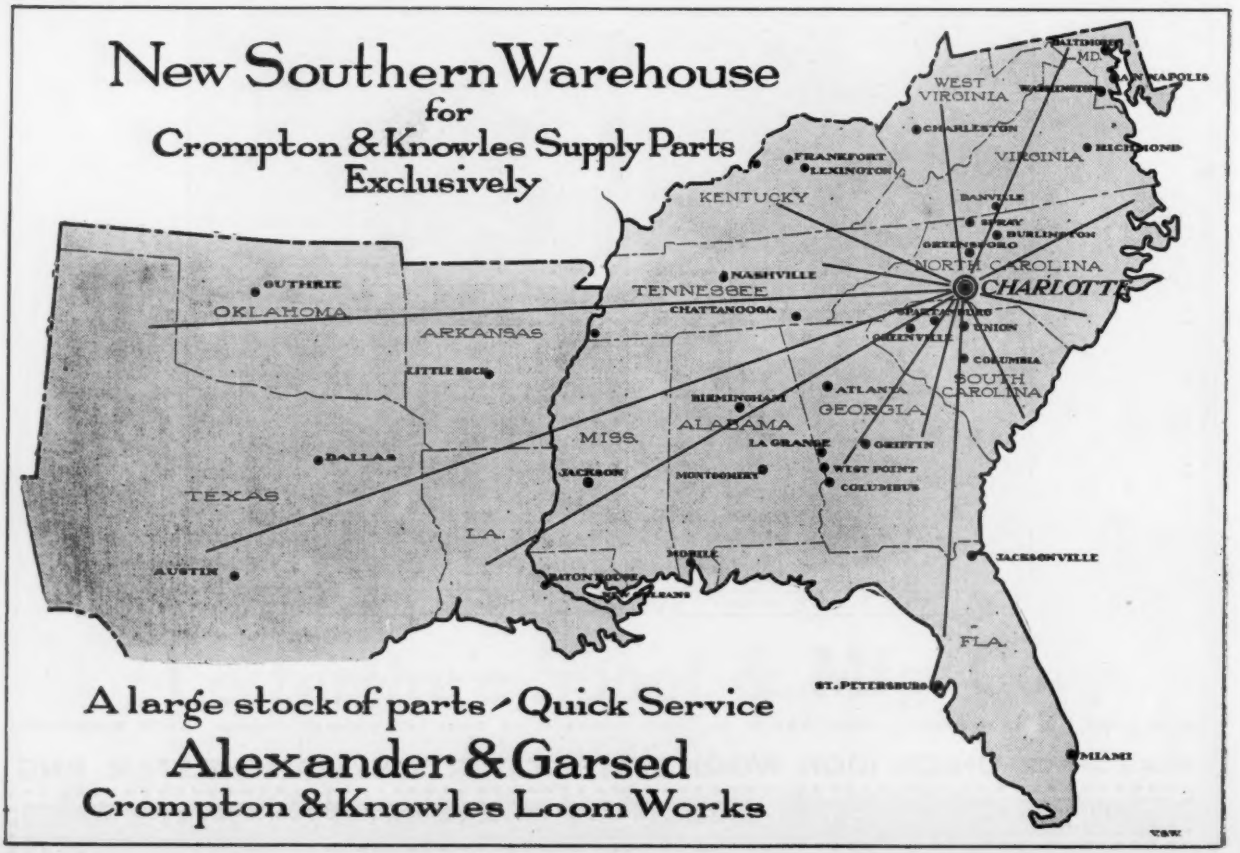
for
Crompton & Knowles Supply Parts Exclusively



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The Schwartz AUTOMATIC ELECTRIC GUIDER

(PATENTED)

For Straight and Swing Tenter Frames

Handles cloth of any kind weight or width

The Only Guider Known That Never Injures Delicate Fabrics

The exclusive principle of the Schwartz Automatic Electric Guider makes it the only guider that handles dependably any width of the most delicate fabric without fear of injury to the cloth surface.

This principle of sliding the wings of the tenter to meet the cloth, as it varies in widths or moves from side to side, is a great improvement over guiders which move the cloth to meet the wings of the tenter. By this principle, the cloth is allowed to run absolutely free and unhindered the same as if fed by hand.

Each wing works independently of the other by means of its own screw—hand wheels formerly used are removed and replaced with gears. Beneath the gears and geared to them are hung small reversible motors of about ⅛ H.P., one for each wing, each motor wire connected to the feelers on each side of frame. These feelers are placed in front of the clips and between the rollers. Any variation of the selvages in either direction causes the feeler to follow the selvage through the action of the motor, the wing keeping in constant touch with the selvage. There is no sparking at the contact points of the feelers. The wings automatically stop when end of piece or bad tears pass through.

The Schwartz is entirely automatic in its operation, is always dependable and requires very little attention. There are few parts—no rollers or brushes subject to wear or which pull the cloth, distort the pattern or injure the surface—no valves to clog up and get out of order. It is easily and quickly installed on any straight or swing center frame.

Ask us today for full information and prices.

BLAKE ELECTRIC MFG. COMPANY,

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The Tremendous Development of the Southern Cotton Manufacturing Industry

THE Southeastern States, in recent years, have shown the greatest development in cotton manufacturing of any section of the country.

Endowed by nature with excellent climatic conditions for manufacturing purposes, with a wealth of native labor and with ports convenient for export, the South has increased its cotton production 272 per cent in the last 25 years. Southern textile manufacturers have been most successful in producing goods economically to meet new market conditions, and Southern goods are shipped and sold throughout the world.

We invite consultation with buyers desiring to meet Southern Manufacturers, or with firms seeking to sell their equipment to Southern mills. Our widespread facilities are at your service.

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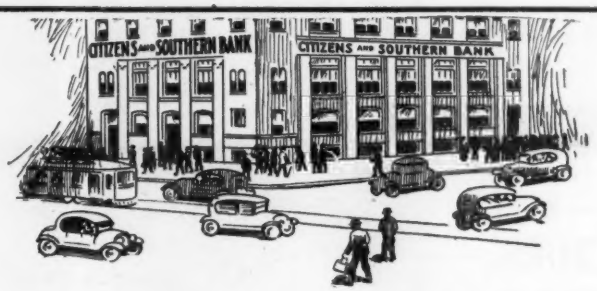
The Bank Whose Strength and Resources Have Kept Pace With This Great Development—



THE Citizens & Southern Bank was created in the interest of the South. Its strength and resources have grown with the Textile Industry.

This Bank is prepared to offer to manufacturers, exporters or bankers every facility for—

Moving cotton and other products,
Financing shipments,
Handling collections and bills of exchange.

Through its resources and facilities, and large number of banking connections, the Citizens & Southern has made it possible for the enterprises of the South to be financed without the aid of outside capital. It is prepared to handle your banking business, foreign or domestic—**"No account too large—none too small."**

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ALL KINDS

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SAVINI FILMS, INCORPORATED
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STARRING
Neal Hart and Wm. (Bill) Fairbanks

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"Go Get Him," "Broadway Buckaroo", "A Western Demon, "Hell's Border" the first four titles

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ATTRACTIONS
—THAT WILL—
PLEASE YOU & PLEASE YOUR PATRONS
—or—
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THAT WILL FILL YOUR THEATRE
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AND FILL YOUR OPEN DATES
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Thrilling Western Features
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A Big Animal Serial
All we ask is a trial.
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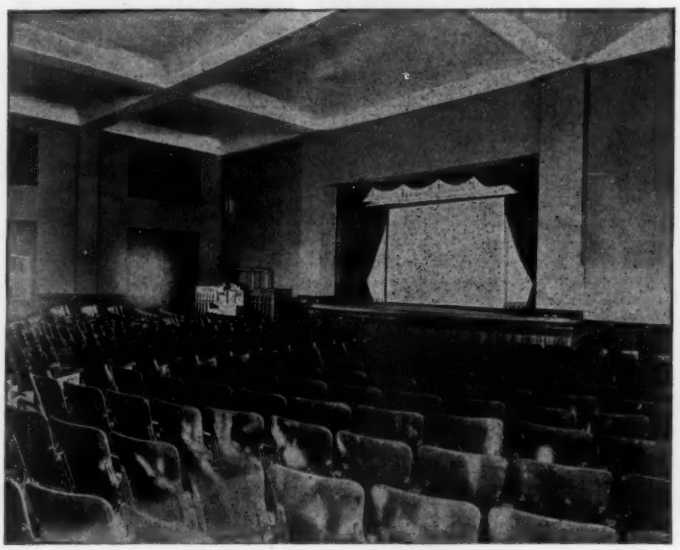
Is Your Name Written There?

Our service to the textile mills is the result of years of experience in installing textile theatre equipment. Our representatives call upon the mills personally, lay out the plans, advise on the proper equipment required and finally supervise the installation and the starting of the theatre. In other words, they take the whole problem off from your hands and do not turn over the work to you until the theatre is operating satisfactorily.



A Typical Textile Mill Theatre.

The textile industry is demanding the best moving pictures for their employees and that is why they regularly specify

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That is why more Power's Projectors are used by textile mills in the South than all other projectors combined.

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Gainesville Cotton Mill	Gainesville
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Pacolet Mfg. Co.	New Holland
Manchester Cotton Mills	Manchester
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Thomaston Cotton Mills	Thomaston
Exposition Cotton Mill	Atlanta
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Conestee Mills	Conestee
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Abbeville Cotton Mills	Abbeville
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Union-Buffalo Mills	Buffalo
Victor-Monaghan Mills	Seneca
Victor-Monaghan Mills	Jonesville
Pacolet Mfg. Co.	Pacolet
Aragon Mills	Rockhill
Graniteville Mfg. Co.	Vancluse
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We carry a complete line of supply parts and equipment at our various branches. Your orders for supply parts will be filled the same day the order is received. Whatever are your needs for your theatre, we can supply them.

We have a special offer for the Textile Mills. May we present it to you?

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SIMPLEX PROJECTORS

ARE CONCEDED TO BE THE MOST SUPERIOR MOTION PICTURE PROJECTION APPARATUS ON THE MARKET AND ARE USED BY THE LARGEST THEATRES, COTTON MILLS AND INDUSTRIAL PLANTS.

COMPLETE ILLUSTRATED CATALOGUE AND OUR BOOKLET OF "PLAIN FACTS" WILL BE MAILED ON REQUEST. AFTER AN EXHAUSTIVE TEST AND MINUTE INVESTIGATIONS EXTENDING OVER A LONG PERIOD

THE BEMIS BROS. BAG CO.

BEMIS, TENN., RECENTLY PURCHASED TWO COMPLETE SIMPLEX PROJECTORS AND WRITE "WE ARE INDEED WELL SATISFIED WITH OUR INSTALLATION, AND CAN HEARTILY RECOMMEND A SIMPLEX PROJECTOR—THE RESULTS ARE CERTAINLY ALL THAT ANYONE COULD REQUIRE."

Let Us Send an Expert
To Assist You in Your Plans

REMEMBER WE FURNISH AUDITORIUMS COMPLETELY, INCLUDING CHAIRS, LIGHTING FIXTURES, SWITCH BOARDS, SCENERY, ETC.

LUCAS Theatre Supply COMPANY

MANUFACTURERS AND DISTRIBUTORS OF HIGH GRADE THEATRE EQUIPMENT

ATLANTA GEORGIA

White Trucks

Five thousand owners operate fleets totaling 50,000 White Trucks

5-ton	$4,500
3½-ton	4,200
2-ton	3,250
¾-ton	2,400

F. O. B. Factory

THE WHITE COMPANY
Cleveland

21 YEARS OF KNOWING HOW

Wooden Packing Cases

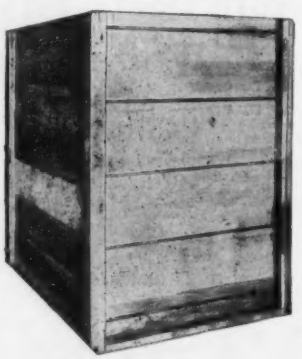
All Styles

Manufactured from
Georgia Pine
White Pine
Poplar
Cypress
and Gum

The interlocking packing case, shown in the upper left-hand corner, has advantages over other packages, especially for carrying heavy materials. In the first place, lighter weight material can be used in its construction on account of the interlocking reinforcement. It is harder to pilfer or break open than other packing cases.

We are now in position to give all orders for shooks prompt attention, and will be glad to quote prices and delivery dates on any cases you might require. Our prices are very much reduced, try us.

In addition to rectangular tanks, we manufacture a complete line of round tanks equipped with round iron hoops and malleable draw lugs.



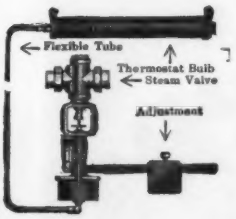
All our tanks are manufactured from heart cypress tank stock and we guarantee them to hold water.

Your inquiry solicited.

Hightower Box & Tank Co.

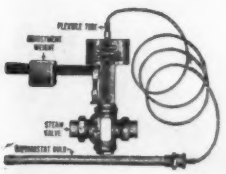
Corner Humphreys and Glenn Streets

Box 1025 **Atlanta, Ga.**



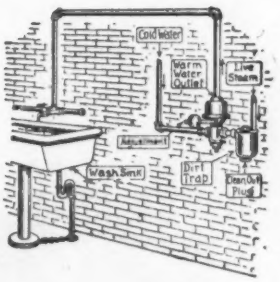
The Powers Regulator No. 15

For control of air temperatures. Very sensitive and reliable. Entirely automatic and self-contained, requiring no outside power for operation. Fine for all drying operations.



The Powers Regulator No. 11

Entirely self-contained, requiring no air or water pressure for operation, automatic, reliable, and accurate. Peculiarly adapted to the control of size box, dye liquor, washing and scouring operations, etc.



The Powers Steam and Water Mixer

Like all other Powers apparatus, the Steam and Water Mixer is a sturdy, dependable machine—it never fails. That's the reason we believe it should be installed in *your* workmen's wash sinks and shower baths.

POWERS

"Put It There"

In practically any place where exact temperature is necessary, a Powers Regulator is made to meet the need. "Put it there!" and eliminate the loss of money and material resulting from failure to maintain proper temperature.

Powers Thermostatic Regulators

Tell us your heat control problems. We are glad to give you the benefit of our thirty years of study and experience; it will place you under no obligation and will probably show you where to

Reduce Costs

THE POWERS REGULATOR CO.
Specialists in Automatic Heat Control

R. 985—126 East 44th St., New York
2761 Greenview Ave., Chicago
596 Boston Wharf Bldg., Boston
The Canadian Powers Regulator Co., Ltd., Toronto, Ont.

These Users Know From Experience

Eatonton Cotton Mills, Eatonton, Ga.
Barrow County Cotton Mills, Winder, Ga.
Huss Mfg. Co., Bessemer City, S. C.
Pee Dee Mfg. Co., Rockingham, N. C.
Proximity Mfg. Co., Greensboro, N. C.
Orinoka Mills, Philadelphia.
Julius Kayser & Co., Brooklyn, N. Y.
Goodyear Tire & Rubber Co., Akron, Ohio.
National Artificial Silk Co., Cleveland.
Boston Woven Hose & Rubber Co., Cambridge, Mass.
Aetna Cotton Mills, Reidsville, N. C.
Salisbury Cotton Mills, Salisbury, N. C.
Arista Mills No. 1, Winston-Salem, N. C.
Great Falls Mfg. Co., Rockingham, N. C.
Dan River Cotton Mills, Danville, Va.
Robinson Clay Products Co., Parral, Ohio.
Fisk Rubber Co., Chicopee Falls.
Henrietta Mills No. 2, Caroleen, N. C.
Henrietta Mills No. 1, Caroleen, N. C.
Whitney Mfg. Co., Whitney, S. C.
Gibson Mfg. Co., Concord, N. C.
Caron Spinning Co., Rochelle, Ill.
Oscar Heineman Co., Chicago.
Hendee Mfg. Co., Springfield, Mass.
Crane Co., Chicago, Ill.
Cleveland Telephone Co., Cleveland.
Dodge Bros., Detroit.
Holtzer Cabot Electric Co., Roxbury, Mass.
Selig Polyscope Co., Chicago.
American Tobacco Co., Chicago.
Airoblast Corp., Chicago.
Drying Systems, Inc., Chicago.
B. F. Sturtevant Co., Hyde Park, Mass.
Carrier Engineering Corp., New York.
Armour &Co., U. S. Yards, Chicago.

(1807A)

TRADE MARK REG. U. S. PAT. OFF.

"Clings to Metal"

SETTING NEW STANDARDS

D-A LUBRICANT convinces the user by superior performance. It lasts longer, keeps metal perfectly oil-filmed, reduces wear and costs by better lubrication with fewer applications.

LEAVES NO GUM OR RESIDUE TO SCRAPE OFF.

STAYS ON CAMS, GEARS, ROLLERS, AND CHAINS—KEEPS FLOORS AND CLOTH CLEAN.

LASTS MANY TIMES LONGER THAN ORDINARY OILS.

COSTS MORE PER POUND—LESS PER MONTH

CONTAINS NO GREASE, GRAPHITE OR ACID

D-A is guaranteed to be as represented or is returnable, Send us your order on this basis.

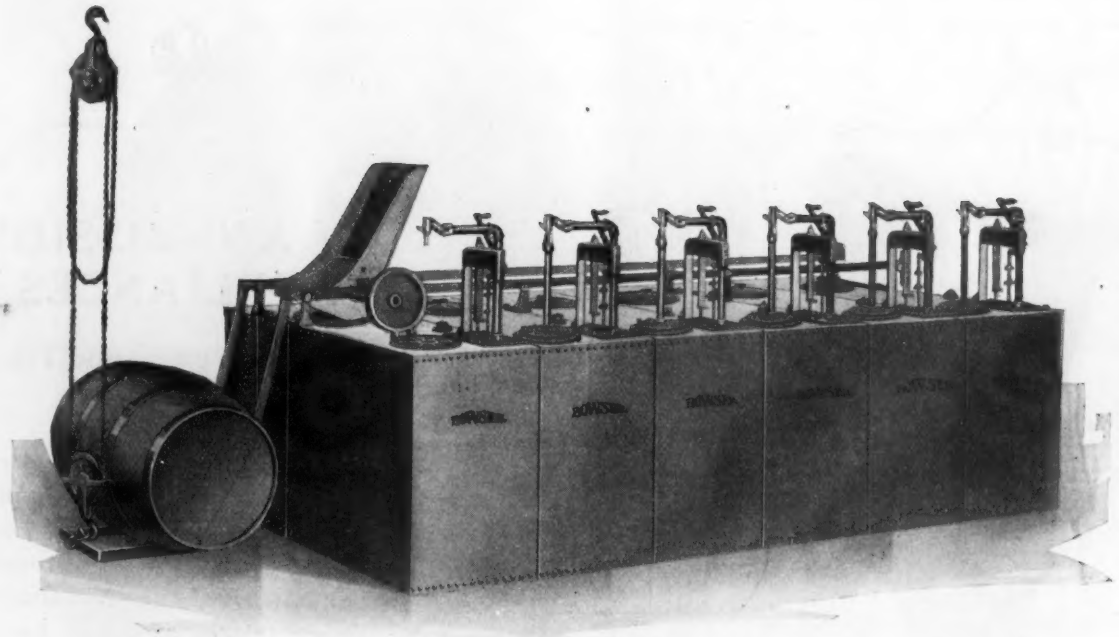
ECONOMICAL :: EFFICIENT :: SAFE

D-A LUBRICANT COMPANY, Inc.

INDIANAPOLIS :: INDIANA

Southern Representative
John K. Gewinner, Atlanta, Ga.

New England Representative
Mac-Nichol-Crosby Co., Boston, Mass.



What Bill Says to Jim Doesn't Pay Dividends

When Bill meets Jim at the oil barrel, they are sure to gossip—for Bill has to wait while Jim fills his oil can. That's six minutes of your time wasted—three by Bill and three by Jim.

And oil is wasted, too—for oil overflows with the conversation.

Stop these wastes. Install the complete Bowser Oil Storage equipment. It is so flexible that it meets any need. All receipts and disbursements of oil are registered. Every drop of oil is clean—no grit can possibly get into the storage tank.

Write today for Bulletin A-45 and let our engineers suggest the way you can save from 17% to 32% on present oil costs.

S. F. BOWSER & COMPANY, Inc.

Oldest and Largest Manufacturers of Self-Measuring Pumps

Home Plant: Fort Wayne, Indiana

Factories and Warehouses: Albany, Dallas, San Francisco, Sydney, Toronto

District Offices: Albany, Atlanta, Chicago, Dallas, Denver, Detroit, Minneapolis, New York, Philadelphia, Pittsburgh, St. Louis, San Francisco, Toronto. Representatives Everywhere.

Branch Offices, with Service Departments, in Principal Cities Abroad

BOWSER

ESTABLISHED 1885

ACCURATE MEASURING PUMPS

Bowser Products

For Handling Gasoline and Oils Wherever Sold or Used

Filling Station Pumps and Tanks for Gasoline.

Portable Tanks for Gasoline and Oil.

Storage and Measuring Outfits for Paints, Oils, Kerosene and Lubricating Oils.

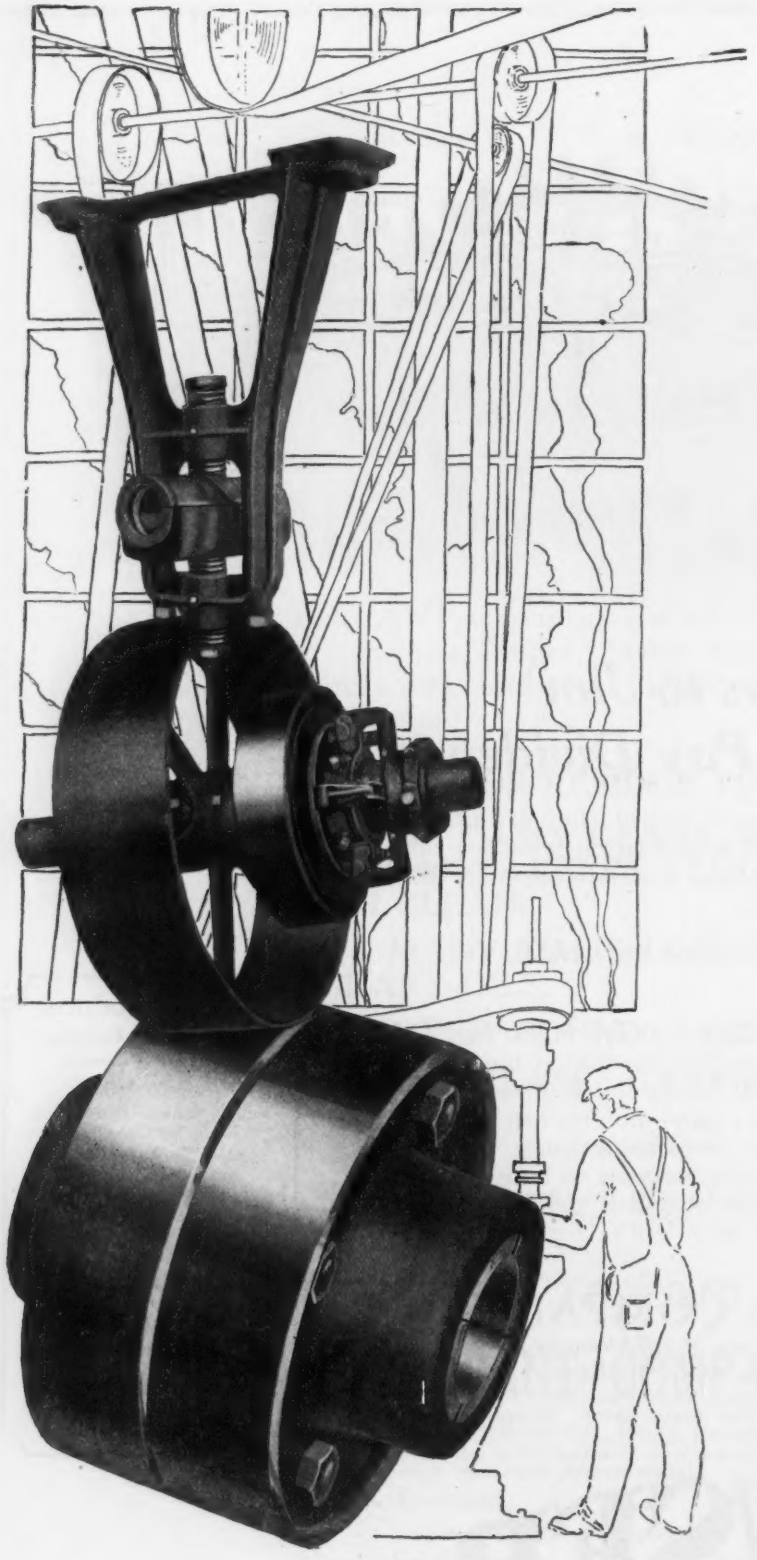
Carload Oil Storage Tanks.

Power Pumps.

Dry Cleaners' Underground Naptha Clarifying Systems.

Richardson-Phenix Oil Circulating and Filtering Systems and Force Feed Lubricators.

Write for Booklets



TRANSMISSION APPLIANCES

Designed on Time-Tried Principles

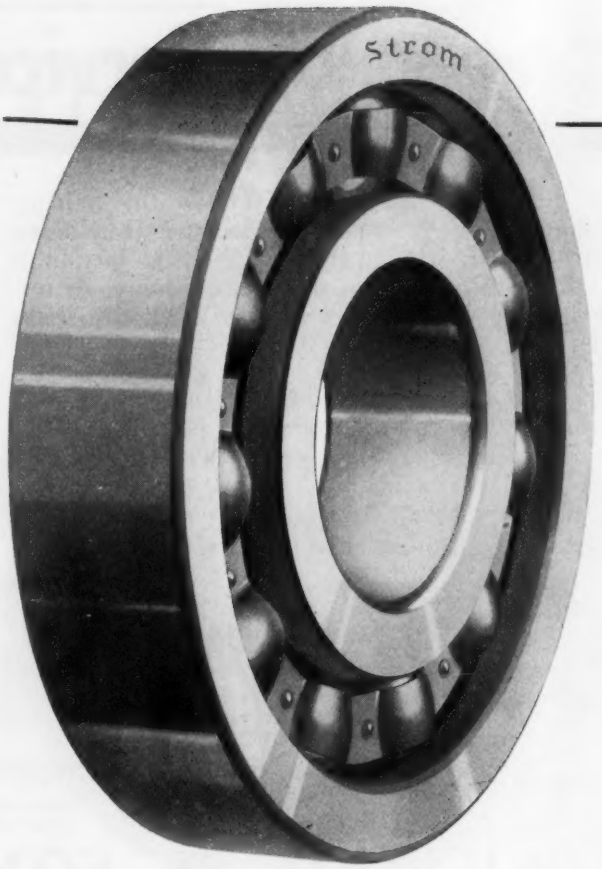
In designing and selecting power transmission appliances, as in everything else, experience is the best teacher. We've been specializing on this class of service for 64 years. We know **which** appliances meet every condition to best advantage and **why.** Our transmission appliances are designed on time-tried principles and our engineers are well qualified to judge which of these principles applies to the solution of any new problem presented. Their services are freely at your disposal.

The T. B. WOOD SONS CO. Line is complete to the last detail and endorsed by its performances in every department of every class of mill.

Details of whole line on request.

T. B. WOOD'S SONS CO.

CHAMBERSBURG, - PENN.



The Picker Room is the Cornerstone of the Mill

A valuable application of Strom Ball Bearings is on the apron rollers of intermediate and finishing pickers. The weight of four laps on an apron that runs on rollers mounted in plain bearings causes a heavy drag on the evener mechanism.

This drag not only makes the evener sluggish and unreliable, but wears out aprons long before they should need replacement. A small Strom bearing on the end of each roller will take the drag off the apron and evener; lengthen the life of the apron, and give you more uniform lap.

The bearings are inexpensive and easy to apply. The wear and tear now going on in your picker room will soon pay for a ball bearing installation.

Order some today from our Southern Distributor, the Aldrich Machine Works, Greenwood, S. C. Put them on and see how much better results you get from the eveners.

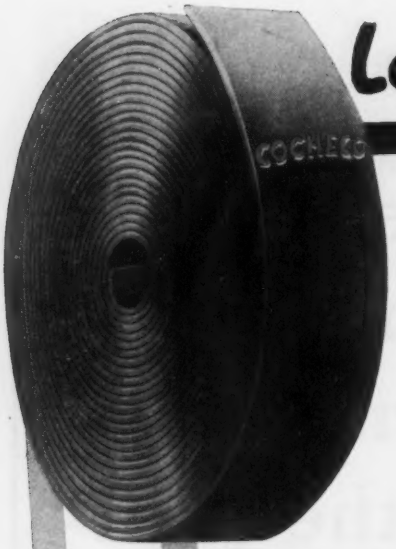
U. S. Ball Bearing Mfg. Co.

(Conrad Patent Licensee)

4544 Palmer St. Chicago, Ill.

Strom BEARINGS

Long, Economical Service



The plant across the way doesn't have the belting troubles that you have. Why? Because they have learned through experience that it PAYS to buy high quality belting. No frequent production delays or unnecessary belting expenses worry the man who uses Cocheco Belting.

COCHECO BELTING is made for SERVICE—not to meet low price competition of CHEAP belting. When figured on a "length of service per dollar invested" basis, this quality belting is the most economical on the market. "COCHECO" BELTING sold more than 20 years ago is still giving perfect satisfaction.

COCHECO TRADE MARK BELTING

COCHECO BELTING is made from choice strips taken from the center of the butt, and is pure oak tanned. It is every inch dependable and guaranteed to give satisfaction.

COCHECO BELTING Quality Belting Since 1842

Send us your inquiry today

I. B. WILLIAMS & SONS

Dover, New Hampshire, - - U. S. A.

14-16 N. Franklin St. Chicago, Ill.
71-73 Murray St. New York, N. Y.
157 Summer St. Boston, Mass.

The Only Vital Difference in Belt Lacings

Alligator teeth penetrate lengthwise clear through the belt. The ends protrude and are clinched down flat with a hammer in making the joint. Note the illustration.

See how each tooth is a tiny vise, holding its share of the burden bearing belt fibres in a powerful pressure grip—making Alligator Steel Belt Lacing the strongest on earth.

Compare This Grip With Other Lacings

"Only a Hammer Needed to Apply It"

Men are continuing to adopt Alligator Steel Belt Lacing as they realize that its greater strength means more continuous use of belt driven power, less rending and tearing of belt ends and actual cash savings far beyond the consideration of the cost of the lacing.

Applied with only a hammer in an average of 3 minutes time. No experience needed to make a smooth perfect hinged joint. A size for every thickness of belt.

If you are not using Alligator, write us for small sample on belt, literature and prices.

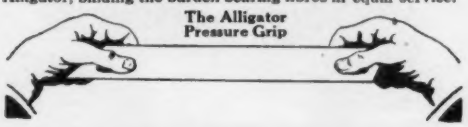
Flexible Steel Lacing Company

4619 Lexington Street CHICAGO, U. S. A.

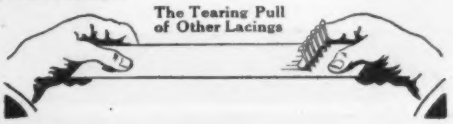
In England at 135 Finsbury Pavement, London, E. C. 2

Prove This Big Point to Yourself With the Simple Tests Below

Stretch a strip of paper in steady equal pull to break it, as illustrated—Note strength. This is similar to the vise grip of Alligator, binding the burden bearing fibres in equal service.



Set a row of pins across a strip of paper. Hold it without pressure between the fingers and pull—Note the slight comparative strength.



ALLIGATOR

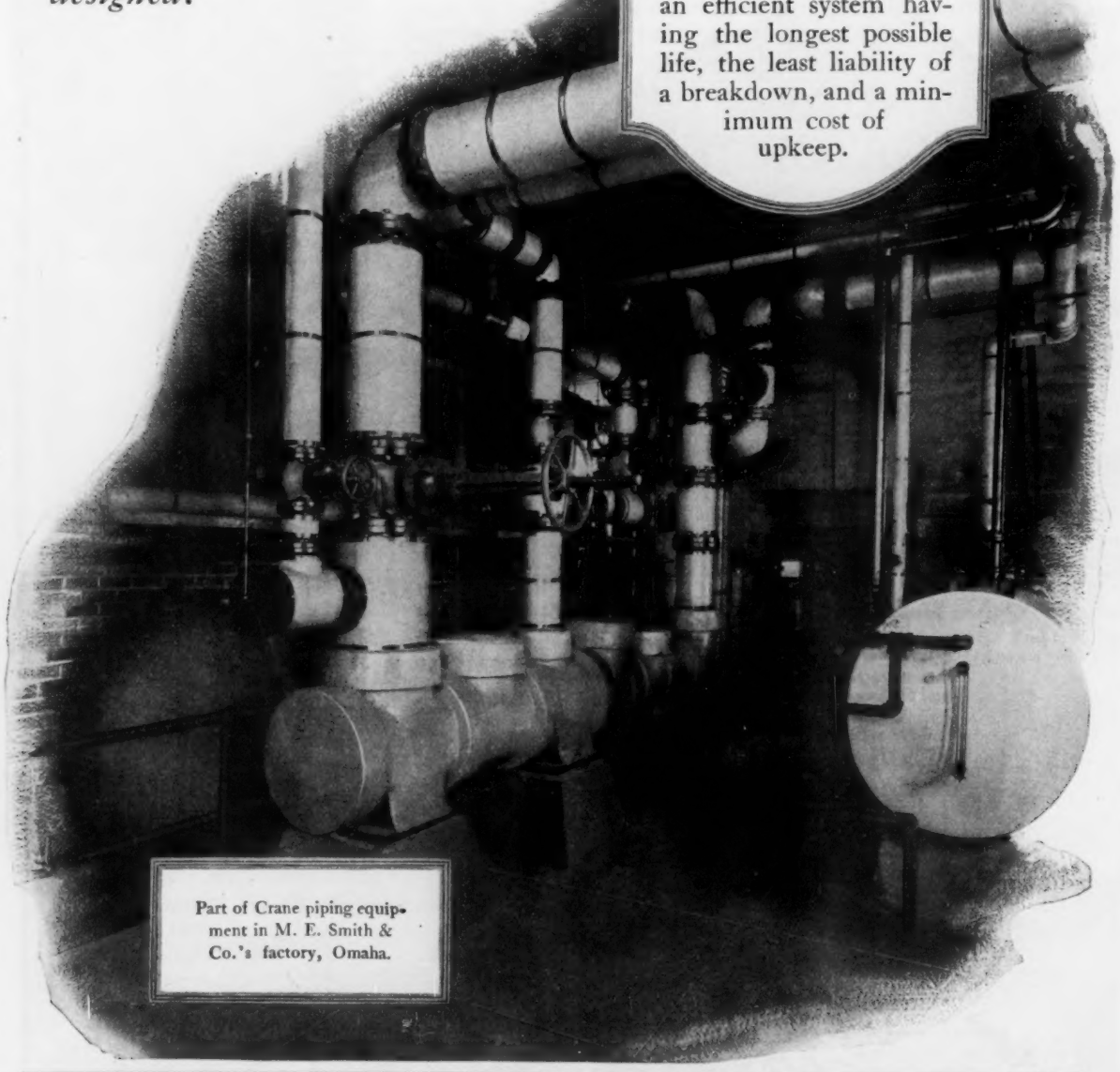
TRADE MARK REG. U.S. PAT. OFFICE

STEEL BELT LACING

Sold at Wholesale and Retail the World Over

DETERMINE the initial cost, erection cost, maintenance cost, and the safety and reliability of a power plant when the system is designed.

CRANE
Power Plant Equipment
is designed with the object of producing an efficient system having the longest possible life, the least liability of a breakdown, and a minimum cost of upkeep.



Part of Crane piping equipment in M. E. Smith & Co.'s factory, Omaha.

SALES OFFICES, WAREHOUSES AND SHOWROOMS:

BOSTON, SPRINGFIELD, HARTFORD, BRIDGEPORT, ROCHESTER, NEW YORK, HARLEM, ALBANY, BROOKLYN, PHILADELPHIA, READING, ATLANTIC CITY, NEWARK, CAMDEN, BALTIMORE, WASHINGTON, SYRACUSE, BUFFALO, SAVANNAH, ATLANTA, KNOXVILLE, BIRMINGHAM, MEMPHIS, LITTLE ROCK, MUSKOGEE, TULSA, OKLAHOMA CITY, WICHITA, ST. LOUIS, KANSAS CITY, TERRE HAUTE, CINCINNATI

CRANE LIMITED — MONTREAL, TORONTO, VANCOUVER, WINNIPEG, CALGARY, REGINA, HALIFAX, OTTAWA.

FOUNDED BY R. T. CRANE, 1855

CRANE CO.
836 S. MICHIGAN AVE.
CHICAGO

WORKS: CHICAGO AND BRIDGEPORT

INDIANAPOLIS, DETROIT, CHICAGO, ROCKFORD, OSHKOSH, GRAND RAPIDS, DAVENPORT, DES MOINES, OMAHA, SIOUX CITY, MANKATO, ST. PAUL, MINNEAPOLIS, WINONA, DULUTH, FARGO, WATERTOWN, ABERDEEN, GREAT FALLS, BILLINGS, SPOKANE, SEATTLE, TACOMA, PORTLAND, POCATELLO, SALT LAKE CITY, OGDEN, RENO, SACRAMENTO, OAKLAND, SAN FRANCISCO, LOS ANGELES

CRANE-BENNETT, LTD. — LONDON, ENG.

We are manufacturers of about 20,000 articles, including valves, pipe fittings and steam specialties, made of brass, iron, ferrosteel, cast steel and forged steel, in all sizes, for all pressures and all purposes, and are distributors through the trade of pipe, heating and plumbing materials.

Established 1854 *Incorporated 1898*

THE A. & F. BROWN CO.

Engineers, Founders and Machinists—Power Transmission Specialists
Engineering and Sales Office, 79 Barclay Street, New York

Works
Elizabethport, N. J.

Stock Room in
New York City

To supply the demand for something better than the commercial material in this line; that is more durable, dependable and economical

The A. & F. Brown Co. formerly designed and built special engines, special pumps and other special machinery.

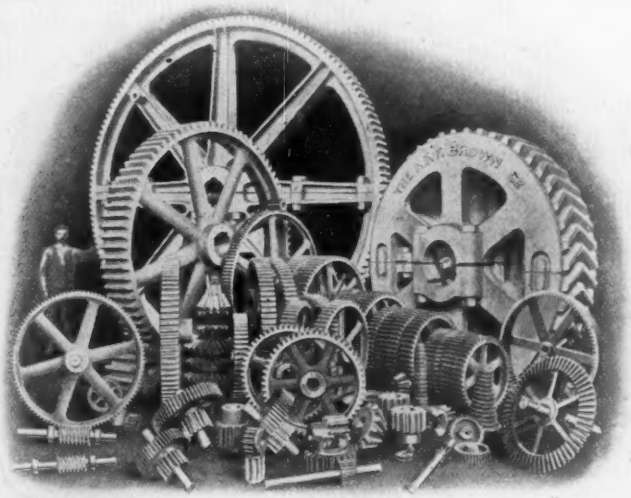
One of their clients and customers (now one of the largest refining plants in the world) practically forced them into the designing and manufacturing of Power Transmission Specialties by commissioning them to further eliminate the expensive delays and stoppages in their continuous process by remedying the defects in the power transmission machinery which the owners later stated to have been "the worst leak of all."

This accomplished led to similar commissions from others.

If you want the best we shall be pleased to serve you, but if you are looking for the cheapest you will buy the commercial material, quality of which is controlled by competitive prices.

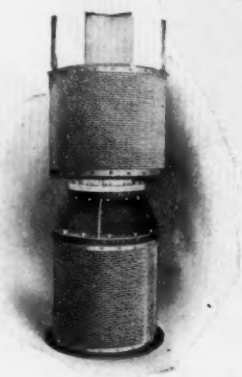
The Original
Double Braced Adjustable Hanger with
F. Brown's Patented Metallic Wick Self-oiler

(copied by many but never equaled)
This oiler will not clog or glaze and the freedom of feed maintains a film of oil between shaft and bearing. The shaft runs in oil. Many of these hangers have been in constant use for 30 to 40 years without rebabbitting and still in good condition. Where there is friction there is wear. When the wear is not appreciable there cannot be much friction.



GEARS FOR MOTOR, MACHINE, MILL OR POWER PLANT

The gears shown in cut range from 16 ft. down to 3 in., the heaviest weighing 28,000 lbs.
Some are machine moulded, and other cut or planed and include steel, semi-steel, cast iron, bronze, rawhide, fibre, bakelite and condensite.



Newman Patent Continuous Service Foot Valve.

No stoppage for cleaning. Outer screen is raised above surface to clean and lowered again. Circular scraper (on upper screen) cleans inner screen of any deposit accumulated while upper screen was raised.

Friction Clutch Pulley
(Our own patent)
Simple, **Durable**, Reliable.

There are several other Brown machinery manufacturers, who make clutches of different designs. If you will communicate with us we will tell you about this one.

SIREN

Same as used on U. S. Navy vessels and army transports that carried our soldiers "over there."

Adopted and installed after competitive tests by the "Committee on Safety," as an alarm in case of an aerial attack on New York City during the war.

By the U. S. and many foreign lighthouse departments as a fog signal.

By towns, oil refineries and large manufacturing plants as a fire and riot alarm.

Also made to operate by compressed air.

MADE IN FOUR SIZES.

The HARRINGTON CHAIN GRATE STOKER

Entirely Automatic

The Only Stoker That Burns Any Coal Under ALL Conditions———

The engineer must produce steam as needed and meet peak loads when they come. In addition, he must balance at the highest points the three essentials—Efficiency—Capacity—Maintenance. He cannot sacrifice either at the cost of the other if he wishes to perfect his power plant.

To keep this balance depends upon the stoker. Most any type of boiler will furnish enough steam and most any engine or turbine will supply sufficient power. But combustion is the varying factor—economical and continuous stoker performance is the exception.

The hand-fired grate is out of the question. It extravagant wastefulness and labor requirements condemned it long ago. Now is the time to modernize if you wish to economize.

To meet and balance the three essentials of the perfect power plant, you must have the mechanical stoker—but it must be an entirely automatic stoker, without limitations and it must be flexible to meet varying load demands. The engineering profession has always admitted the fundamental superiority of the conveyor feeding principle of stoking, and what shortcomings this principle may have had formerly in other movable stokers has been overcome by a corps of expert engineers, who, after twenty years of scientific research and experiments, have perfected the Harrington Chain Grate Stoker.

The Harrington is the only stoker on the market that will burn successfully the lowest grades of fuel under any plant condition, and is the only practical non-sifting, self-cleaning stoker. It operates entirely automatic, and requires only one man to operate several units. It enables the engineer to drive the boiler far above normal rating. Everything about the Harrington is constructed to withstand the longest and most severe service.

Numbers of plants have replaced their former grates and stokers with Harringtons. One of the country's largest public utility companies, after a six months' test and comparison, installed eighteen Harringtons—pretty good proof of the superiority of the Harrington over any other stoker on the market.

Greater efficiency and economy in fuel, labor and maintenance expense is the resut of an investment in a Harrington Stoker. Ask for full information—today.

PUT YOUR PROBLEMS UP TO OUR ENGINEERING DEPARTMENT.

TWELVE POINTS OF SUPERIORITY

1 Allows fuel to remain quiet.

2 Burns inferior grades of coal—discharges all accumulation of refuse.

3 Periodically and completely cleans all air space.

4 Divided into compartments so that the air pressure is regulated to varying depths of fuel on the stoker.

5 Readily convertible to natural draft during low load periods.

6 No driving strain transmitted through the grate clips. They support the fuel — heavy driving links of semi-steel traveling on rollers carry the grate forward.

7 All parts subjected to the fire are readily replaceable while stoker is in action.

8 Continuous motion to grate surface—eliminating jar and wear.

9 A non-sifting grate surface.

10 Stationary Rear Girder — no sprockets, shafts or rollers.

11 No wearing parts that do not come to the front at each revolution of the grate.

12 Twenty years of experience combined with an organization of the foremost engineers of the United States backed by a responsible manufacturer.

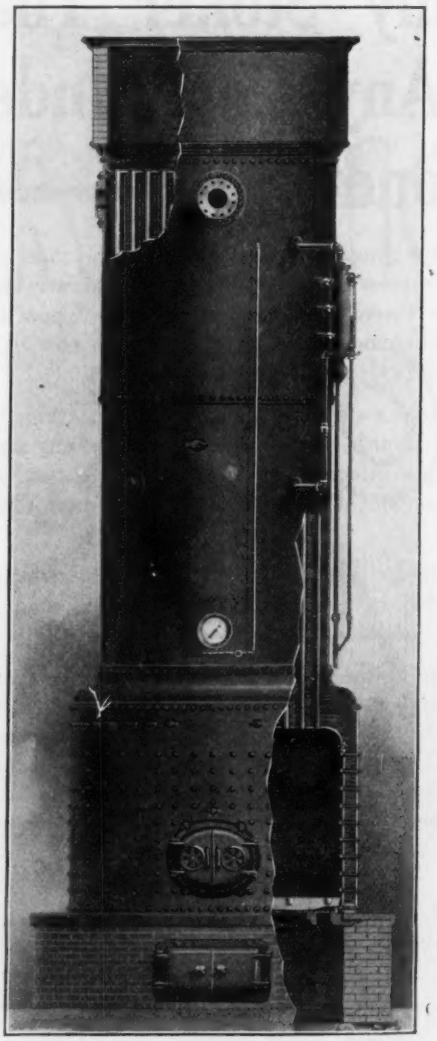
United Machine & Mfg. Co.

Also Manufacturers of Industrial Underfeed Stokers and MOSHER Separators and Desaturators.

CANTON, OHIO

NEW YORK, PHILADELPHIA, CLEVELAND, PITTSBURGH, ST. PAUL

SEATTLE, CHICAGO, COLUMBUS, KANSAS CITY, ATLANTA



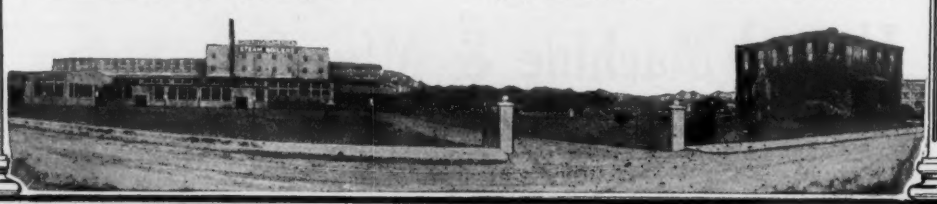
Manning Type Vertical Boiler
Adapted for Mill Work

INTERNATIONAL ENGINEERING WORKS, Inc.
FRAMINGHAM, MASS.

Southern Representative,
Isaac Hardeman, Charlotte, N. C.

BOSTON
PHILADELPHIA

NEW YORK
SAN FRANCISCO



TUPELO FLOORING IS—

TOUGH, with an "involved grain," therefore not affected by the hard knocks which a floor in factory, mill, warehouse or platform must expect.

UNDER FOOT, or "under wheel"—trucks included—a Tupelo floor grows smoother and solider with wear—*and tear.*

PUT down a new Tupelo floor, or replace an old "slivery" one—(of some other wood)—with Tupelo, and "that settles it" for all time.

EVERY factory, textile mill, warehouse or platform should be floored with *Tupelo "The Hard-Wear Lumber."*

LET us tell you why. You owe it to yourself to get posted on this natural-born "honest-to-goodness" flooring.

OF course, there will be no obligation on your part, if you ask. We want you to know all there is and then decide for yourself.

Please Address the Office Nearest You.

SOUTHERN CYPRESS MANUFACTURERS' ASSOCIATION

805 Poydras Bldg., New Orleans, La., or 805 Graham Bldg., Jacksonville, Fla.

THE FUNCTIONS OF THE ENGINEER

The Advantages of Individual Motor Drive to the Textile Industry

WHILE not the most important development in the textile industry matured by the Engineer, the perfected application of the individual motor drive is one of his important contributions to the progress of this industry.

In those processes, like spinning and weaving, which require uniform speed, the average quality of the product is much improved by this type of drive and the percentage of rejections is decreased.

It possesses further advantages in the economy of power, when but part of the mill is in operation, as frequently happens with night work.

Additional favorable features are: elimination of belting maintenance and replacement, better light, absence of flying lint, freedom from obstructions to ventilation and more floor space for operatives and traffic.

This organization of Engineers pioneered in the application of direct drive and it has directed more than two-thirds of all such installations in the South.

This subject is discussed further in "Picks to the Minute," a copy of which awaits your request.

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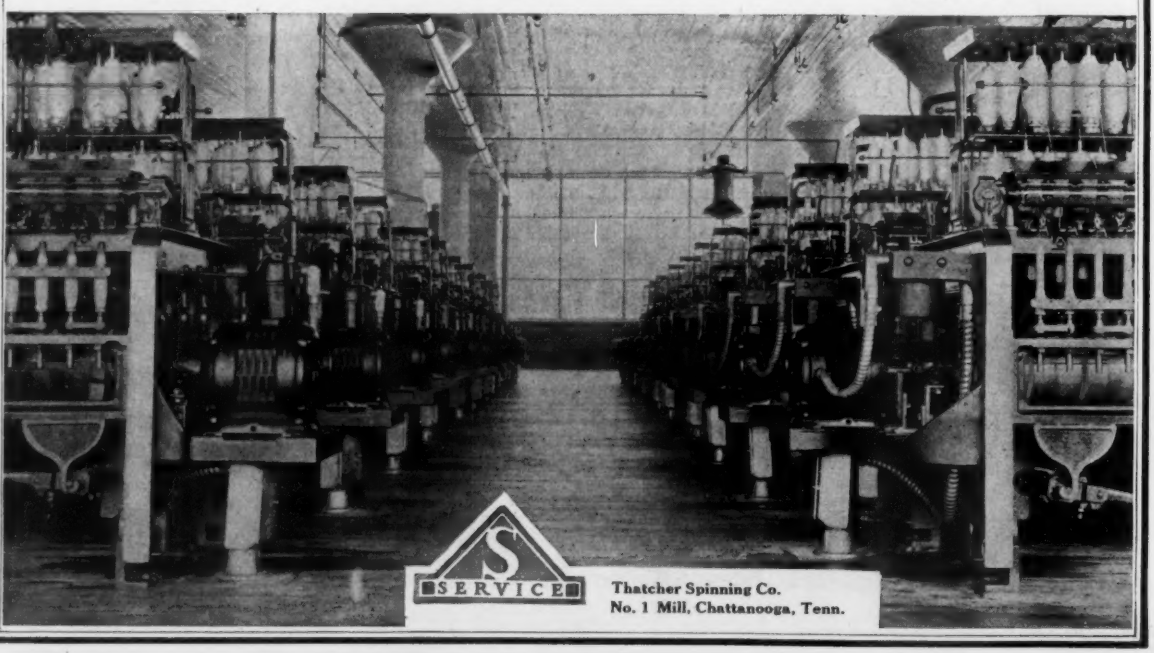
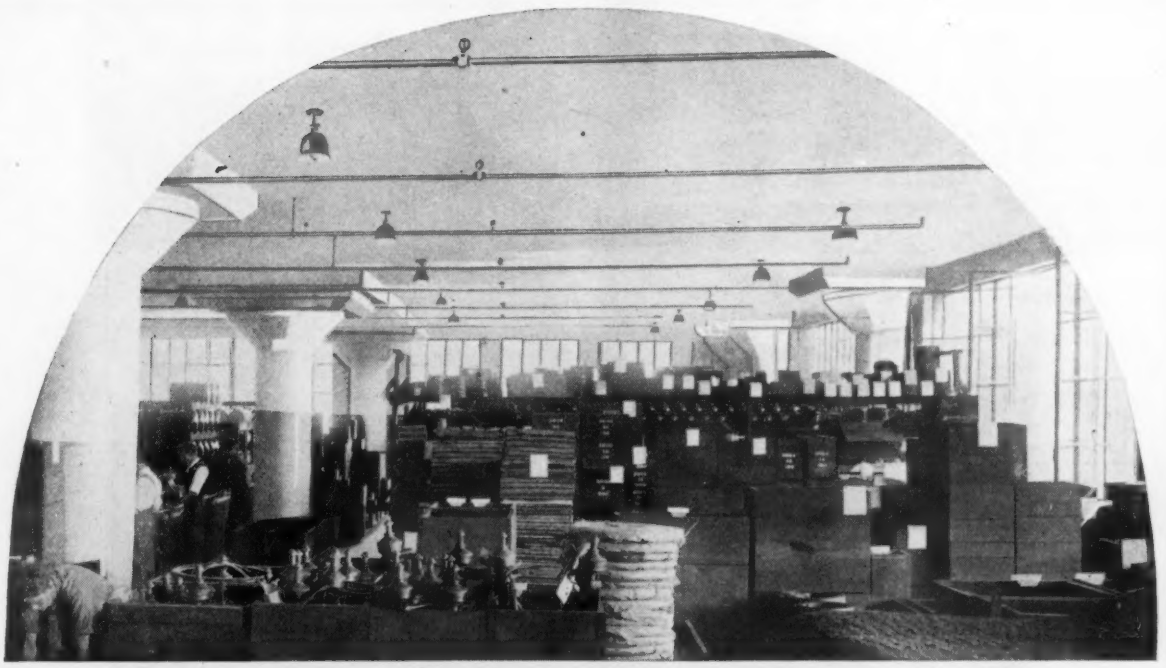


Thatcher Spinning Co.
No. 1 Mill, Chattanooga, Tenn.



A Long Term Investment in Daylight

Here are the two questions we want you to ask about Dixielite—**"How much daylight will it coax into my workrooms?"** and **"How long will it last?"** For these are the two prime essentials to consider before purchasing a mill white.

Comparative tests, scientific tests, and long experience in practically every kind of mill, factory and warehouse have proved that Dixielite **attracts** and **reflects** more daylight than any other mill white made.

It causes no glare, but diffuses light evenly to the furthest and darkest corners. For Dixielite is white—not a near white, but a pure, rich white.

And it stays white. Time cannot turn Dixielite yellow nor make it chip, crack or peel. It's washable—soap and water keep it spotless. And figured over a term of years, Dixielite is the cheapest mill white to buy. It is the one perfect white finish for walls and ceilings.

Dixielite comes in flat, semi-gloss and gloss finishes. Eighty years of paint-making experience guarantee its superiority. Write for booklet No. 51 "Keeping in the Spotlight" and any further information you want.

A Word About the Outside.

For the outside of buildings of brick, cement and stucco use Bay State Brick and Cement Coating. It beautifies and waterproofs the surface it covers. The hardest rain cannot beat through a Bay State coated wall. Write for Booklet No. 51.

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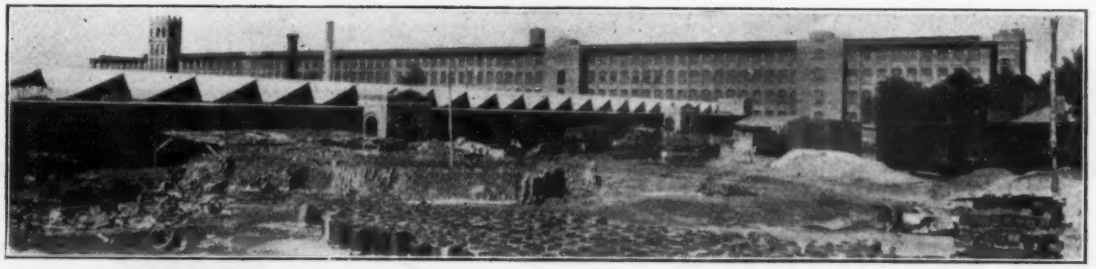

Immense mill extension and weave shed built during 1919 and 1920 for the Bibb Mfg. Co. of Columbus, Ga. Roberts & Co., Architects, Atlanta, Ga.; T. C. Thompson & Bros., Contractors, Charlotte, N. C.

CONCRETE most exactly meets the demand for fireproof, sanitary, durable construction

—and the BEST concrete is

Slag Concrete

What the Southern Mills are Doing

(Excerpts from March, 1922, COTTON.)

Report is to the effect that the Stonewall Cotton Mill's at Stonewall, Miss., will soon improve the plant extensively.

The Eatonton Cotton Mills at Eatonton, Ga., have announced that they will invest several thousand dollars in improving and enlarging their mill and property. The erection of a community house for operatives is being planned and consideration is being given also to the addition of a considerable floor space to the manufacturing building.

The Hawthorn Spinning Co. (Clover, S. C.) is erecting a two-story brick community building.

Contracts have been awarded on the new additions and improvements planned by the Vance Cotton Mills at Salisbury, N. C.

Highland Cordage Co. of Hickory, N. C., have begun work on spinning plant, 80 x 240 ft., and 60 to 80 houses in the village. A warehouse 130 x 200 ft. has already been erected.

Here are the sound reasons why Southern mill owners are turning to reinforced concrete, in which the coarse aggregate used is

"ENSLEY" & "ALA CITY"
BASIC SLAG
CRUSHED & SCREENED

1. Slag concrete buildings are practically fireproof.
2. Almost free from repairs.
3. Require no painting.
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6. They are practically everlasting.

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Slag Headquarters for the South

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Better Light Assures a Greater Working Area

YOU can increase your productive floor space by making dark, useless corners useful.

This extension of usable working area can be accomplished by painting all walls and ceilings with OJACO Mill White—the snowy-white, lustrous paint that reflects every ray of natural and artificial light.

Light-forsaken spaces that are now unproductive can be reclaimed by OJACO Mill White. Interior surfaces that are OJACO Mill-Whitened diffuse the sun's rays without glare, over the machinery, onto the workers and manufactured products—conserving daylight, increasing output and keeping down lighting costs.

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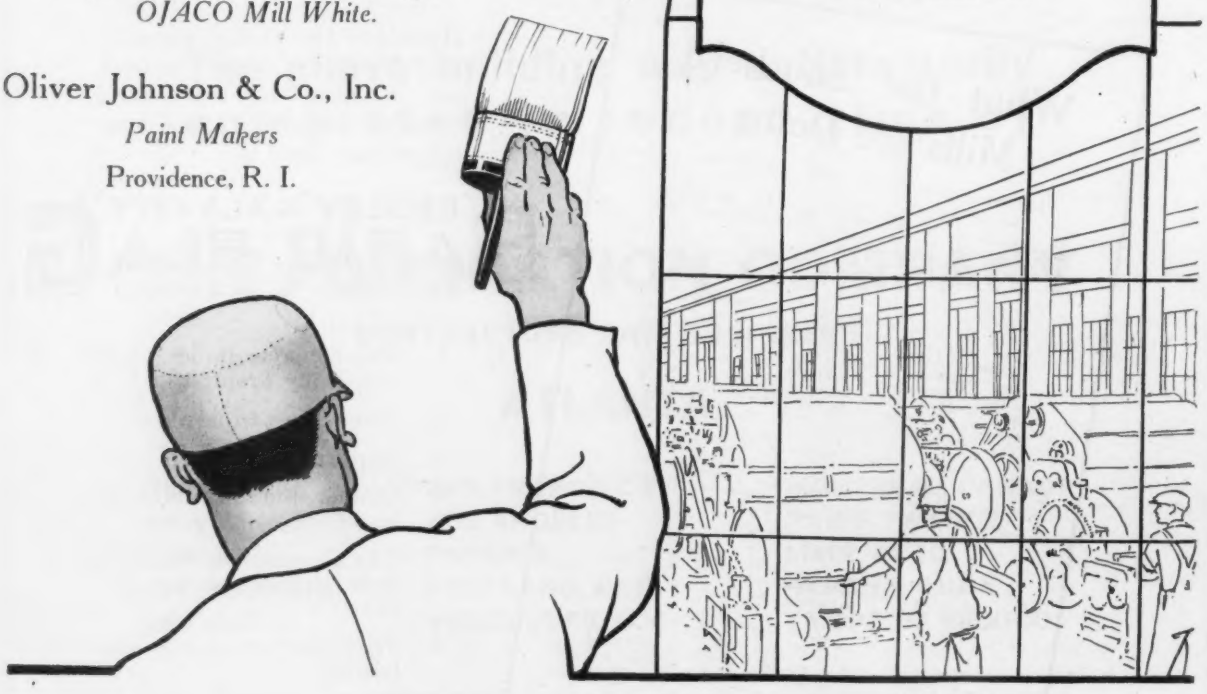

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Nesting readily, Armco Culverts cost little for transportation—as complete units they can be installed by unskilled labor and because of their extreme lifetime of service, Armco Culverts cut down street repair and replacement costs to a minimum. UNBREAKABLE.

Armco Culverts are built to an exceptional standard—basically an iron 99.84% pure—every operation in their manufacture is watched over with zealous and exacting care—every completed culvert is subjected to a severe inspection.

Neither shallow fills, ponderous traffic, severe weather, climatic changes nor other usual devastating influences hold any menace for Armco Culverts. By their corrugated, arched construction and great strength they withstand extraordinary pressure, as well as shock, vibration, expansion or contraction.

The Value of a Well Planned Street is in Ratio to the Efficacy of its Drainage System—Streets Equipped with Armco Culverts are Invariably GOOD Streets.

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Resists Rust

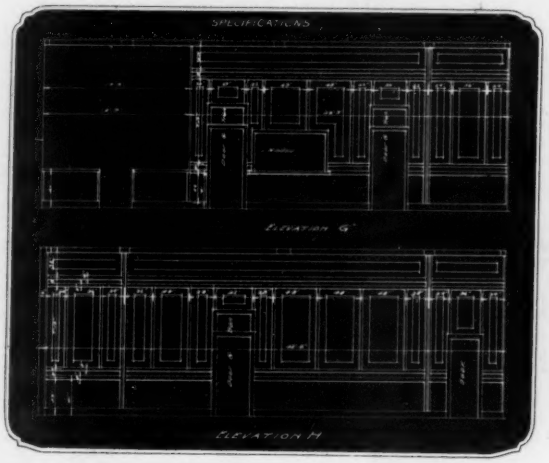
"Oatmeal" Finish—
"Mill-Primed"

Cornell Wood Board

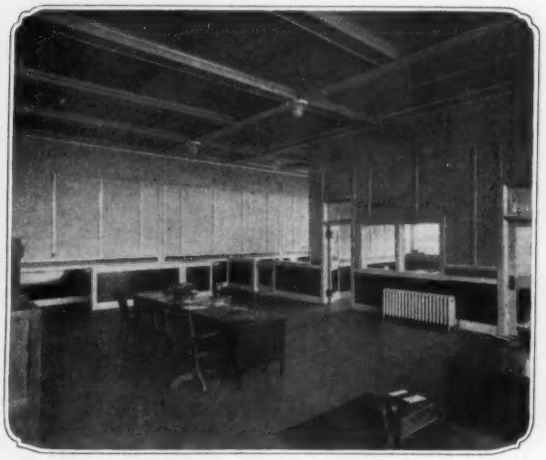
Pure Wood Fiber
"Triple-Sized"

Eight lengths, 6 to 16 ft.—two widths, "Cornell 32" and "Cornell 48"

The Panel Plan



The Finished Interior



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WHETHER you are planning to finish the walls and ceilings of an entire mill-housing project or a single room in a home, store or mill, Cornell's Department of Design and Decorations is at your service without cost.

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OUR Tugalo development, to be completed by January 1, 1924, will increase our Hydro-electric capacity from 131,000 to 211,000 horse power.

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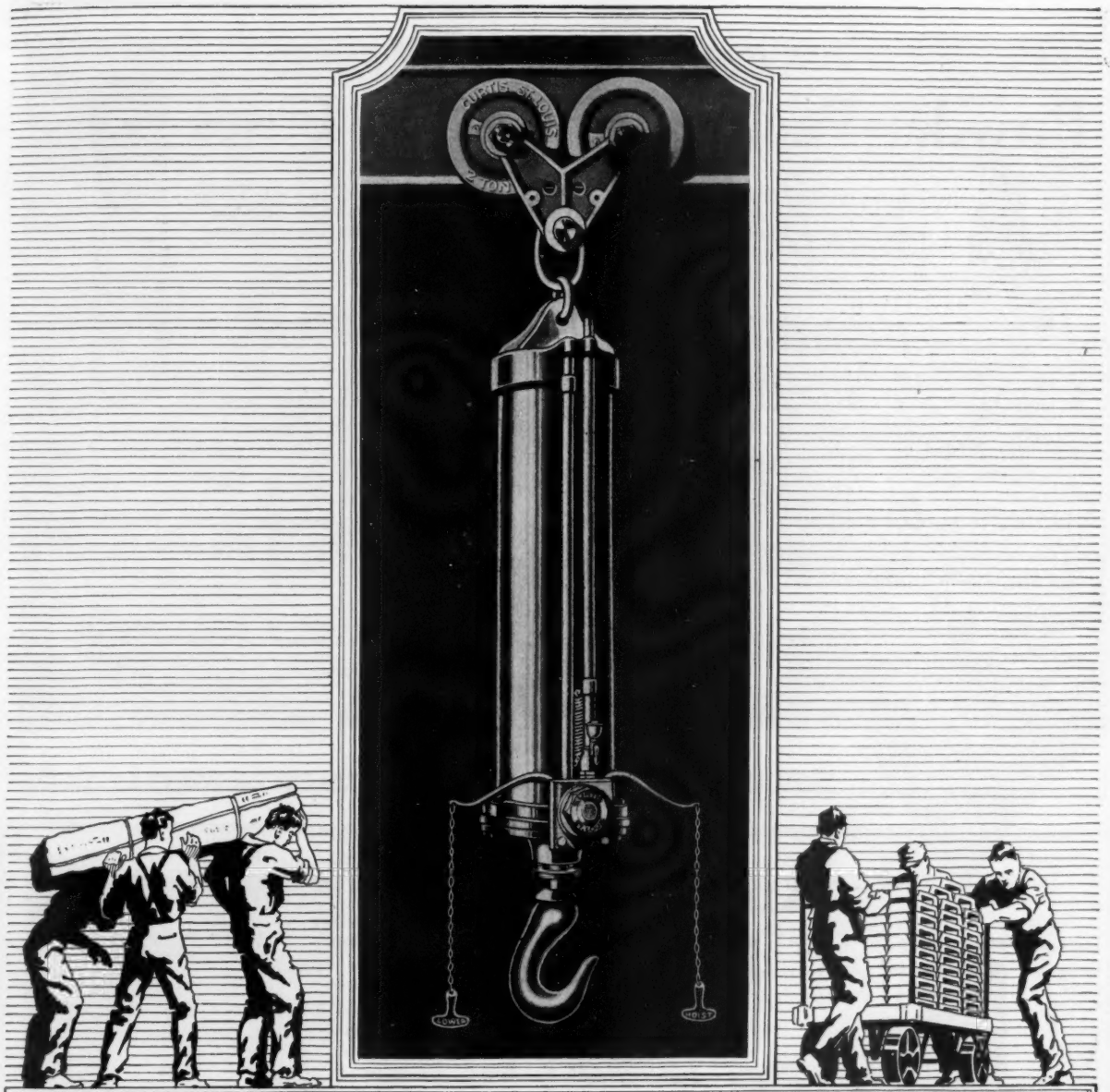

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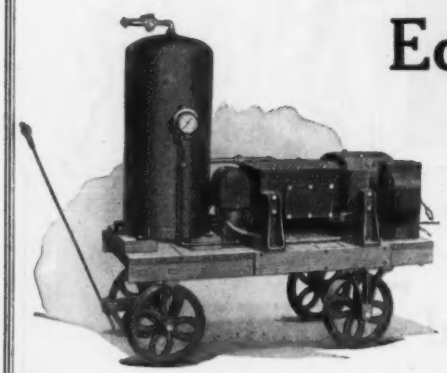

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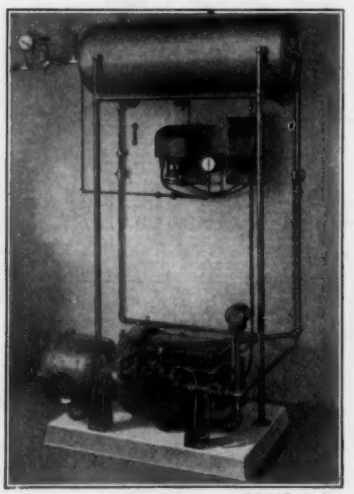

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An Investment—Not an Expense

Good textile mill lighting is an investment that pays dividends every working day.

First: It increases production, because it enables workmen to see more quickly and easily. **Second:** It betters employee morale. **Third:** It enables workmen to see machines running idle. **Fourth:** It decreases spoilage — often as much as 50%. **Fifth:** It makes possible proper sanitation. **Sixth:** It prevents many minor accidents. Good lighting pays for itself on any one count.

Mill executives in every textile center have proved to their own satisfaction that adequate lighting does these things. Many of them have done so with IVANHOE RLM reflectors and bowl-enameled MAZDA lamps. This lighting directs the light where it belongs and gives value received for every dollar spent for current.

Is your lighting an investment—or a liability? Near you is an IVANHOE distributor who will gladly advise you without obligation on your part. See him at once, or write to us direct.

An unretouched photograph of a weave room in a southern cotton mill, equipped with IVANHOE RLM reflectors and bowl-enameled MAZDA lamps. This lighting soon paid for itself in increased production and savings effected. Today, as it has been doing for months, the small amount of money invested in this installation is paying six dividends every working day. Ask why.

IVANHOE-REGENT WORKS of General Electric Co.
Cleveland, Ohio

"Ivanhoe" Steel Reflectors Lighting Glassware, Anderson Self-Adjusting Arms, and Illuminating Service.

"SERVICE TO LAMPS"

IVANHOE

GLASS SHADES - STEEL REFLECTORS

NATIONAL U.S.A. DYES

Co-operation

In order to insure that the dyes now made by the National Aniline & Chemical Company, Inc., covering practically every activity of the color using trades, shall give the fullest satisfaction, the work of the chemist must necessarily be supplemented by that of the dyer.

What is essential is co-operation between the dye user and the dye-maker in discriminating and correct selection and application of the dyes now placed by this Company at the disposal of the textile manufacturer.

To that end the National Aniline & Chemical Company, Inc., offers the resources of its laboratories and technical staff in an advisory and constructive way to its customers in the working out of all problems that may arise in their daily operations.

National Aniline and Chemical Company, Inc.

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COTTON

Published Monthly by

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Volume 86 No. 7

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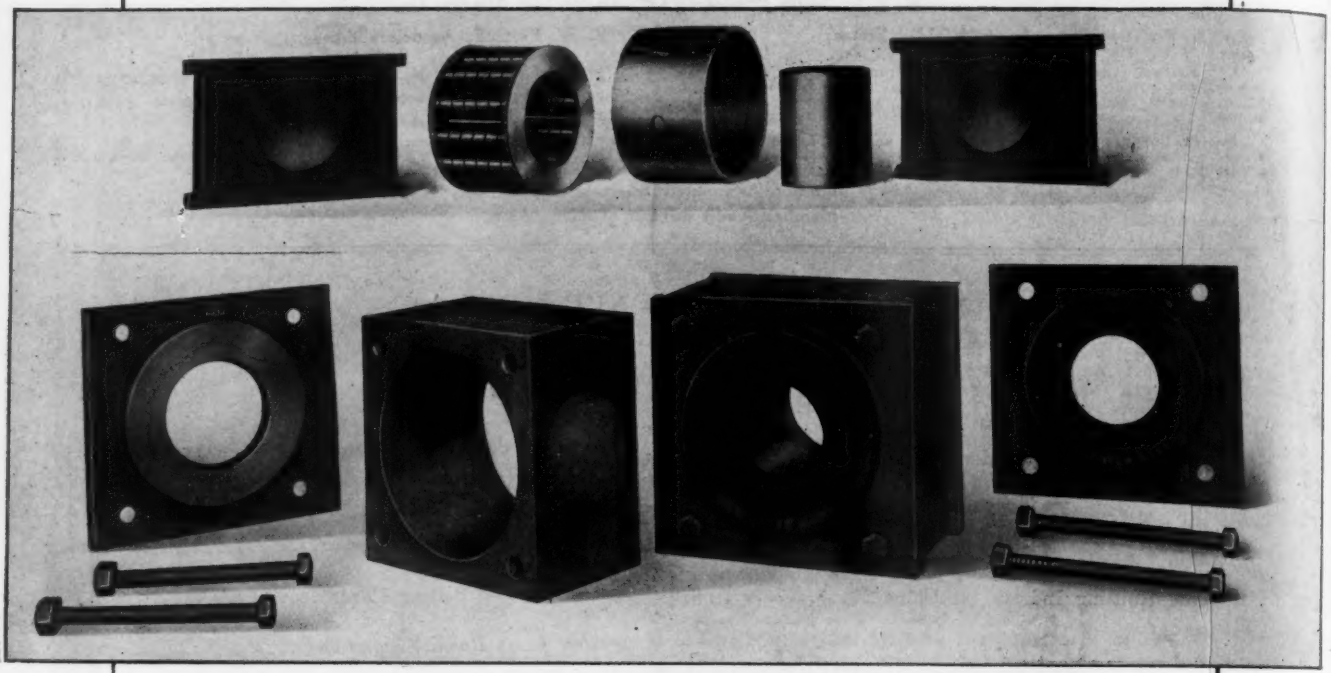
Rejuvenate Your Finishing Machinery Use Hyatt Bearing Replacement Boxes



These and similar Hyatt bearing replacement boxes have been recently installed on 12 Washers and 12 Squeezers at a large finishing plant in Rhode Island. They will eliminate oil troubles, save 25 to 30% power, and being durable will give truly dependable service. Boxes made by the G. & N. Machine Company, Worcester, Mass.

To secure the many advantages of Hyatt roller bearings on washers, squeezers and calendering machines it is not necessary to wait until you order new equipment.

These Hyatt bearing replacement boxes are designed especially for finishing machinery and are an easy, economical method of adding years of useful service to the life of your present equipment.

Lubrication troubles are eliminated by the use of Hyatt bearings because the drip proof boxes prevent oil being thrown onto goods and also keep water out of the bearings. The bearings need only be lubricated with heavy oil or light grease three to four times a year.

A prominent manufacturer of washers finds that Hyatt bearings save from 25 to 30% of the power required when ordinary bearings with their rubbing friction are used.

These advantages can be secured throughout the life of the machinery without bearing replacement because Hyatt bearings are durable and operate for years with no appreciable wear.

Can you longer afford to operate ordinary bearing finishing machinery? Rejuvenate it by the use of Hyatt bearing replacement boxes—it pays.

Hyatt Roller Bearing Co., Industrial Bearings Division **New York, N. Y.**

Motor Bearings Division, Detroit
Tractor Bearings Division, Chicago

USE HYATT BEARINGS ON YOUR LINE SHAFTS TOO BULLETIN 125

Pacific Coast Division
San Francisco

With the Publishers—

Edward Hoover Shive.

Cost, Production and Prices

According to the United States Tariff Commission, the term catgut is derived from kitgut, an old term for violin gut. Catgut is made almost invariably from the intestines of sheep, never from the intestines of cats.

An investigation into the making of textile prices discloses a distinct analogy with the foregoing statement. Prices are based on demand, supply, market rumors, what George says, the need for money, the desire to keep a working organization intact, and frequently on a pure blue sky guess, but almost never on actual costs and production at the factory.

For this reason the illustrated article appearing upon another page and entitled "A Pay Roll System for the Underwear Mill" is of especial importance to that branch of the industry, as it gives such manufacturers an opportunity to secure direct from their payroll a record of attendance, labor distribution with analysis, and much other worthwhile production information that will aid materially in fixing a base for prices that is safe and reasonable.

The author of this article, Edward Hoover Shive, has had a rather unusual business experience that has especially fitted him to render service in this direction. Born in Philadelphia, he was educated in the public schools of the city, finally finishing at the Wharton School, University of Pennsylvania, in 1906. Entering the mechanical engineering department of The Enterprise Mfg. Co., of Pa., at Philadelphia, he immediately became interested in cost and production engineering. He later became assistant superintendent of The Griswold Mfg. Co., at Erie, Pa., founders and machinists, with whom he remained until early in 1910, when he resigned to become cost and production manager of the Barnes and Erb Laundry Machinery Division (at Philadelphia) of the American Laundry Machinery Company, soon being sent in a like capacity to the principal plant of this company at Chicago. Four years experience in the building of modern laundry machinery had carried with it a study of the proper methods of operation of such equipment, and it became evident to Mr. Shive that many laundries of the United States were as careless about the operating of their machinery as they were about their customers' linen, so in 1914 he joined forces with The Forrest Laundry of Philadelphia (then and now one of the very best of public laundries). He found that a few months application of engineering methods produced such excellent results that he in turn successfully applied these methods to The Locust Laundry Co., of Philadelphia, The Manhattan Steam Laundry of Jersey City, The American Steam Laundry of Morey and LaRue at Elizabeth, N. J., and the Paris Laundry Company of Chicago.

While employed at systematizing this laundry work, Mr. Shive was afforded an excellent opportunity to study textile fabrics, and in 1915 he became connected with Miller, Franklin, Basset and Co., of New York, consulting industrial engineers, and as a junior engineer, he started in upon a large cotton blanket manufacturing concern. When this job was successfully finished, they were called upon to install cost and production methods in a knitted underwear mill. This work was so thoroughly and satisfactorily done that many other mill owners or managers called at this mill to inspect the system used, resulting in other similar work until at this time more than sixty underwear mills are using these cost and production methods practically as installed at the first mill.

During Mr. Shive's connection with Miller, Franklin, Basset and Co., he called upon 118 different underwear mills and explained better cost finding and production methods and their advantages. This was done through the cooperation of the association known as The Knit Goods Manufacturers of America and the work covered a continuous period of four years.

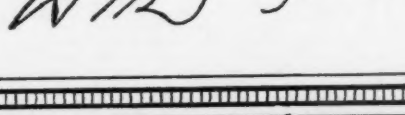
At present Mr. Shive is a stockholder and director in the Taunton (Massachusetts) Knitting Company, manufacturers of high grade knitted union suits for men and boys, being actively in charge of the cost and production department.

In connection with this cost article announcement it is of interest to note that Cotton's editors have some other cost articles in preparation. These will apply to the spinning and weaving end of the industry and will go into such necessary details of the work as to make their principles applicable in almost any plant.

AMONG COTTON'S READERS

Arthur M. Dixon,
Secretary and Treasurer Dixon Mills, Inc.,
Gastonia, N. C.

"The man who fails to read seldom makes much progress in any line of endeavor. COTTON offers a fine opportunity to the progressive mill man to keep abreast of the times. I peruse its pages each month with pleasure and profit."



May, Nineteen-Twenty-Two

Commerce and Our Merchant Marine.

Behind the cloud of ship subsidy debates in Washington and elsewhere, there looms one incontestable fact: The disappearance of the American merchant marine will be a vital blow to American industry and American commerce.

Before the war, American manufacturers and producers could take their chances on permitting ships of foreign flags to carry their output. America's rivalry in world trade was only beginning; America was a debtor country; America owed millions, yes billions, to the great maritime nations of Europe, and she could always depend upon them to furnish her with ships with which to carry the goods that were to pay these debts.

It is different now. The world owes us money; the world outside the United States looks upon us as a great rival; we need expect little aid and less of favors. We must find new markets, and we must be able to carry our goods to them. We can never find new markets with other nations' ships. If we are to carry our cargoes off the beaten paths, we must do so in our own bottoms; if we are to explore for new consumers, we must do so with our own vessels.

Nor will that competition be easy. Europe is after these markets; Europe is after them with subsidized and established merchant marines, with organizations perfected by years of experience while we were permitting European agents to do our marketing for us.

It is in this way that the question of the maintenance of a real American fleet of commercial ships affects all of us, whether we be on the seaboard or thousands of miles from the ocean. If we cannot reach the markets of the world with our goods, the factories of Illinois will feel it as quickly as the factories of Massachusetts. If we can not find an outlet for our surplus, the farmers of Texas and Kansas will discover it just as quickly as the farmers of California. Our statesmen have labored hard at the task of trying to discover a means that will make it possible for the bankrupt nations of Europe to buy our products, because they know that only by restoring the normal courses of commercial life can our own prosperity be insured.

But what would it avail us, if Europe got ready to buy tomorrow, and we had to depend upon rivals to carry our commerce; especially if those rivals were situated otherwise as well as we are in the effort to supply that market. Last winter, it was the purchase by the government of $20,000,000 worth of grain to feed starving Russia, that played an important part in sending farm products upward in the markets. Every farmer felt the resultant increase in price. But even this would have been futile, had it not been that the government was able to put its hands upon ships to carry these tons of grain.

Government operation of the great fleet of merchant ships which was built by the nation during the war has proved a costly failure. Nor is there apparently any hope that some one may yet discover a way by which the government will be able to turn its operations into profit. The best the present Shipping Board has been able to do has been to scale down the apparent operating losses to something like $50,000,000 a year.

That fact has of itself helped to give impetus to the ship subsidy proposal made by President Harding and indorsed by the Shipping Board. As its chief proponents admit, it is the use of the word subsidy that has caused most of the trouble. The nation does not take kindly to "subsidies" of any kind. Throughout the years before the war, the battle waged against the various ship subsidy proposals has made that word taste bad in American mouths, and that taste seems to still linger, despite changed conditions.

Roughly, the presidential plan is to take 10 per cent of the customs duties collected on goods brought into the United States by American or foreign ships, and to add to this "merchant marine fund," all tonnage charges, taxes and fees imposed on vessels entering our ports as well as the funds appropriated by the Postoffice department for the carriage of mails—except parcels post—by American steamers. This fund is then to be used to aid the American merchant marine. The basis of this compensation is to be one-half of one per cent per gross ton, for each mile traveled. For ships with a speed exceeding 13 knots per hour, there is to be an additional allowance based on the speed and ranging from an extra two-tenths of a cent per gross ton for a speed between 13 and 14 knots to 2.6 cents per gross ton for a speed of 23 knots or greater. All such subsidized ships are to carry free the United States mails—again excepting parcels post.

President Harding estimated the first year's operations of this plan at $15,000,000, with an ultimate expenditure up to $30,000,000.

"Commerce is inseparable from progress and attain-

ment," said the President in his message to Congress, recommending this plan. "Commerce and its handmaidens have wrought the greater intimacy among nations which calls for understandings and guarantees of peace. However we work it out, whatever our adjustments are to promote international trade, it is inevitable that the hundred millions here, outstanding in genius and unrivaled in industry and incalculable in their resources, must be conspicuous in the world's exchanges. We cannot hope to compete unless we carry, and our concord and our influence are sure to be measured by that unfailing standard which is found in a nation's merchant marine."

In supporting this program the Shipping Board declared that the governmental operation of the mercantile fleet had proved a disastrous failure, and that continued government operation made private operation so uncertain that it was difficult to induce private capitalists to buy the ships or run competing lines.

"The inefficiencies of government operation, the great loss thereby accruing through the continuance of the Emergency Fleet Corporation, the uncertainty in the minds of private owners because of that continued operation and the need of a policy to insure the disposition of the government owned fleet," declared Chairman Lasker before the congressional committees, "all testify to the fact that expedition is the essence in the enactment of the ligislation for which the President has asked. Delay may be fatal. The Shipping Board would view with alarm inaction by this Congress on the legislation which the President has asked.

"We come before you pleading an all-American question, non-partisan, with the unanimous recommendation of all the members of our board, Democratic and Republican alike. We come before you to plead that through the enactment of the legislation proposed by the President, America may take its place on the seas as it has won its place on the land. We come before you to plead that an instrument of war be turned into a glorious and profitable instrument of peace, and that we thereby insure to coming generations the heritage which should rightly be theirs."

A Question of Duty.

That permanent and carefully prepared immigration legislation is a much needed attribute to our galaxy of national laws is a statement in which all red blooded Americans will heartily concur. But it is going to take a concerted movement on the part of these Americans to induce prompt action among their representatives at Washington and to overcome the tendency to inject politics into the issue whenever any part of it is brought up for discussion.

The House has passed an extension of the three per cent restriction act by a vote of 281 to 36, and Chairman Albert Johnson of the House Committee on Immigration and Naturalization has promised to introduce amendments that will make the law more workable. One of these amendments, that will probably be offered by special resolution, is intended to take care of the boundary situation so that European immigrants, who are piling up in Canada, Mexico, and Cuba, hoping to beat our present restrictive act, will not be permitted to do so. Another will take care of the situations caused by landing immigrants in excess of quota, under bond, by the ruling of the Secretary of Labor.

A minority of the Committee took exception to some of the recent decisions of the Secretary of Labor on this latter question, but, as pointed out by Chairman Johnson, the former Secretary admitted 10,000 sick, insane and diseased people in one year and did not ask Congress for one word of authority. These objectionable aliens are now in this country and doubtless many of them are married to American citizens and therefore can no longer be deported. They are here to breed long lines of weaklings and degenerates and perhaps some with the strain of insanity.

The trouble is with the law and its methods of enforcement. Whenever some of these rotten facts are forced on the attention of the average busy American, he shudders with the horror of it and demands of his neighbor of the moment, "Why don't *they* stop such things?" He does not bring home to himself the fact that *he* is as much responsible as any man in the Congress, unless he has already forcibly expressed himself to his representative as to his wishes, desires and beliefs in the matter—and it's generally a safe bet that he hasn't.

Undoubtedly the United States of America badly needs permanent and carefully prepared immigration and naturalization legislation. Unquestionably many Americans are aware of this need. If each reader who concedes the truth of these statements will write his Congressman urging early action toward this much desired end, the moral support thus engendered will have a distinctly favorable effect in smoothing out the political obstacles that beset the path of legislative acts of this character.

Since the preceding paragraphs were written, the Senate, on April 15th, adopted the House resolution extending the three per cent immigration restriction act until June 1st, 1924. They also adopted amendments, one of which provides a penalty for bringing in immigrants in excess of the legal quota that amounts to $200 plus the cost of a return ticket for each immigrant so carried. Another amendment, designed to prevent temporary colonization in nearby countries by those who intend to later come to the United States, extends the time of residence in such countries from the one year demanded by the present law to a period of five years.

These changes and amendments will have to be concurred in by the House and should be supported and urged by all interested. But, after all, this is only a two-year truce, and the real fight for a permanent law is yet to come.

The Knitting Industry of China.

More than three years ago an article was published in COTTON describing the development of the knitting industry in Hong Kong. At the time it was pointed out that some interest was being manifested in this direction in Shanghai. In this connection a recent report to the Department of Commerce from Julean Arnold, commercial attache at Peking, is of interest as he indicates that closely allied to the textile industries of China are the knitting mills which are springing up rapidly in Shanghai. Cotton knitted underwear finds an almost unlimited market in China, he claims, and the development of mills to supply

(*Continued on page* 496.)

Spindle Selection and Care

BY S. PINDLE.

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No other appliance is so closely associated with the art of spinning as the spindle. Having, as it no doubt did, its beginning closely connected with that of spinning, how slow, when one thinks of it, has been the development of the spindle. Hundreds, nay, perhaps thousands, of years dragged by before the twig that was the progenitor of the spindle of distaff association culminated in its present pinnacle of consummation—the mule spindle. But, on the other hand, how rapid has been the progress of that wonderful mechanism, called the self-centering, the gravity, or the top spindle. For it is largely to this infant prodigy among spindles that the present age owes its gigantic and cheap production of yarns and threads.

Every one of the various types of the self-centering spindle now on the market has as its fundamental basis the principle of being able to rotate without vibration at high speed, and with bobbins and load not always well-balanced.

For the prospective buyer of spinning and doubling machinery, the choice of spindles resolves itself into about two chief classes: tape-driven and band-driven. The latter only will be dealt with in this article.

Being the older of the two, the band-driven spindle is

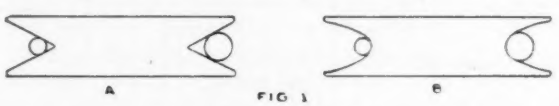


FIG 1

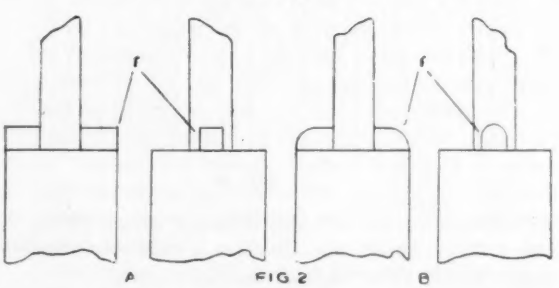


FIG 2

today made with a variety of changes in its component parts. The latter, essentially, are a blade with band-whirl attached, a bolster in which the blade revolves, and a base into which the bolster together with its blade is fitted.

There is probably not a great deal of choice between the different makes, either foreign or domestic; all do their work well, while none, of course, is absolutely perfect. Becoming accustomed to one particular style will often prejudice a user in favor of that special type.

No attempt will be made to discuss specifically the advantages or disadvantages of the different makes; but mention will be made of certain parts that have a bearing on the efficiency of spindles in general.

A difference of opinion, for instance, may exist in the matter of whirls. Should they be round-bottomed or V-shaped? A glance at Fig. 1 will show that with a V-shaped whirl (A) a change in the size of the banding changes the point of contact; whereas, the round-bottom of (B) permits a variation in the size of banding without producing a change in point of contact. It will be quite patent that with the round-bottom whirl a stronger band can be used without affecting the spindle speed; so that from this point of view the honors rest with the round-bottom.

The feathers on the whirl jacket which drive the bobbin should receive consideration when ordering doubling spindles. At (A), Fig. 2, are seen feathers (f), sharp-edged and sharp-cornered. Such feathers will quickly ream away the bottom of the bobbins, causing them, as it were, to lose their cohesive affinity for the spindles. They persist in jumping, resulting in bad work, and eventually are prematurely discarded. The type displayed at (B) is more desirable.

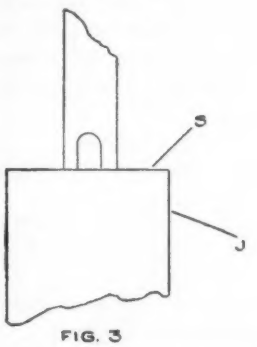


FIG. 3

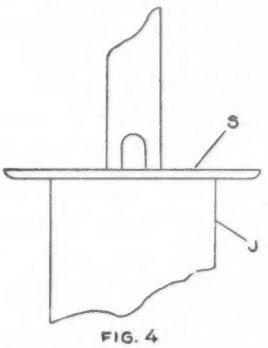


FIG. 4

In connection with the shape of the feathers, the type of the bobbin-seat may be taken up. Spindles usually have the bobbin-seat (s) of the whirl-jacket (j), Fig. 3 of the same diameter as the jacket. Some have been made with a seat, Fig. 4, large enough to accommodate the full width of the bobbin bottoms. Superseded as it has been, this type had one good point worth mentioning. The longer feathers were slower in wearing the bobbin bottoms, and the bobbins themselves, resting wholly on the seat, as they did, would not drop below their normal position, a condition often met with in the case of bobbins bored out

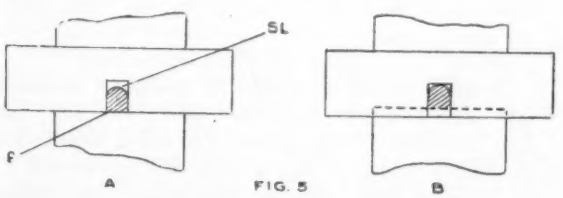


FIG. 5

by the regular sized feathers. In the latter case, if the slots (sl) of the bobbin (A), Fig. 5, are, say 1/16th of an inch deeper than the height of the feathers (f), the wearing action of the latter will cause the bobbin to settle until the intervening space is taken up. Obviously, when this point is reached (see dotted line of B), the bobbin will be that distance below the normal level—a condition that in warp wound bobbins will cause a cave-in at the bottom making it difficult to run off such bobbins at the winding or reeling.

Bases are now made solid—no old-fashioned removable bottoms for cleaning out dirty oil. A space between the lower part of the bolster and the base serves as a deposi-

tory for sediment. Another tendency is to increase the length of the lower section of the spindle. This enables the blade to be extended, top and bottom, and a correspondingly longer bobbin may be used. It must not be forgotton, however, that the bigger the spindle, the greater the consumption of driving power. The increase, however, in the yardage on the longer bobbin deserves attention, because such an augmentation means less knots and less doffing.

Whether or not to have spindles with oil nozzles is another problem. It may be said that with this style of spindle, the periodical oiling is largely simplified, because it can be done without interfering with the running of the machinery and at any time. When, to facilitate banding, the oil nozzles are placed at the back of the spindle-rail, a curved stem oil cup can be advantageously used. Obviously, nozzles in back of the spindle-rail are harder to keep clean than those in a front or side position.

Those devices called holder-downs, hooks, finger bars, and so on, which fit over some part of the whirl flange, and serve as locks to prevent the blade from being uncermoniously jerked out of its base, are now made in a variety of shapes. Among them are:

(1) a combination oil-nozzle cover and lock;
(2) an ordinary wire-hook threaded to fit a tapped hole in the base;
(3) fingered bars that are fastened to the spindle rail and project over the back of the whirl flange;
(4) a combination brake and hook;
(5) a special post attached to the base, and having a movable cap that extends over the flange;
(6) short metal bars, each serving several spindles, and rigidly held in automatic locking brackets.

Of these, the ones better able to withstand the rough usage accorded them from the yanking up of tight bobbins in the doubling department are 4, 5 and 6.

Taken by and large, unimportant as it may appear at first sight, the blade-lock has a big role to play in those departments—wet doubling, for example—where, despite regular and systematic reaming, the wood bobbins are continually contracting, binding on the blade with such a tenacity that only a strong pull will release them. Were no detaining device, then, at hand to hold the blade, the latter would be wrenched out of its base altogether, to the great endangerment of the bolster, and the certain stretching, if not positive rupture, of the band.

Mention having been made of brakes in conjunction with blade-locks, the knee-brake itself will now receive some attention. The exasperating situation brought about by futilely trying to stop a large spindle carrying a ¼ to ½-pound load needs no description. The operative struggles desperately to stop the spindle, one foot off the floor, the knee pressing against the brake, the foot on the floor sliding in all directions, until finally, almost exhausted, he seizes the thread-board or some other convenient part of the machine and by this help succeeds in stopping the spindle.

Not all workers—in truth, but very few—will go through all this trouble to stop the spindle, if the brake is derelict in its function. They will piece up their ends and jam down the bobbins on the revolving feathers. It doesn't require gray hair nor a lifetime of mill experience to correctly infer from this procedure that the bobbin bottoms are going to wear out pretty rapidly, and not infrequently the spindles may come out second best. Actually, one, and sometimes both, feathers are broken.

When the brakes fail on the lighter spindles (say, for 1½ to 2 inch rings), the blade is often pulled one side by the operatives by means of the bobbin and so brought to a stop; for it stops readily if pulled over far enough. Half an eye can see that this pulling will bend the blades if the practice is repeated often. From these illustrations it will be granted that there are good reasons for selecting a type of brake that will stop the spindle without requiring too much time or effort on part of the workers.

While it may, no doubt, show up the respective worth and other features of the several makes of spindles on the market to have a frame or two of each, yet in practice it is found that such a procedure will often cause confusion in keeping up the supply of extra parts. It is better to have all of one type; although several rooms or sections, of course, may each have a different make.

Putting in New Spindles.

Assuming that a mill is discarding its old spindles, the removal of these and the putting into place of the new spindles require alert attention if the job is to be done thoroughly and with dispatch. The assumption being, of course, that the work will be undertaken by the people in the room.

Just as soon as the new spindles arrive, the whirls

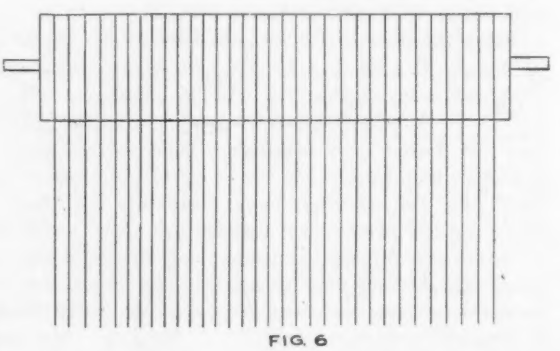


FIG. 6

should be tested for size with a double gauge, having one side a fraction under size, the other, a trifle over. Spindles going beyond these limits should be rejected.

When it is desired not to interrupt the production, the spindle changing can be done at the week ends. To have the same persons doing the same job or jobs on each successive machine is a pointer well worth advocating. Everyone then knows what he has to do, and in the practice of doing it acquires dexterity and speed.

Obviously, the first task in taking out old spindles is to remove the bobbins; next, the bands are slipped off the whirls and onto the bases. If the spindles are to be sold and used again, the complete spindle must be taken out integrally—no mixing of blades, bolsters, or bases. But if the spindles are to be scrapped for junk, no such care need be taken; and after the bands have been slipped off, the blades can be cast into boxes, or other convenient receptacles. The bands are then pulled from the bases and left hanging, each in its respective place on the cylinder, or tin roller (see Fig. 6).

One person can loosen the nuts of the boxes of the bases sufficiently so that other workers, sitting on low trucks, or boxes, can remove them with their fingers. Nuts, wash-

ers, and bases are then put into boxes or pails. By using the latter, the floor is kept free from the oil in the bases. Sometimes it is advisable to empty the bases. This can be done by tipping the bases upside down over a pail, holding the bolster in place with the tip of a finger.

Ring rails may or may not be removed from the frame when taking out the spindles. When they are left on the machine, they should be placed at that point of the traverse where they will not interfere with the work. The top of the traverse is a good place.

After the old spindles have been taken out, the spindle rail should be scraped and thoroughly wiped. Washing with hot soda water may be necessary when the scale does not yield to scraper or waste. It is absolutely requisite that a smooth surface be presented to the spindle base rest; otherwise, the spindles will be thrown out of alignment, perpendicularly.

As the machine shops take special care to crate the spindles in such a way that the assembled whole remains together, it behooves everybody working about the frame to exercise due care not to let the blades or bolsters drop out of the new bases. Blades and bolsters, in particular, should never be mixed up because these parts are fitted, and may not work well if separated.

The bases should all be put in facing the same way. This is easy with those types that have oil-nozzles, or a locking arrangement for the blade, attached to the base. Some types, however, do not have these auxiliaries; therefor, it is essential that care be taken that the slot or pin of the bolster is either to the right or the left side, as the case may be. Such uniformity simplifies the process of renewing or replacing of bolsters when necessary for repairing, cleaning, adjusting, and so on.

It will expedite the work if one person will place the nut with the washer on top of it on the lower rail, and under its respective base. A word to the wise here. The nuts must be put on with the finished side uppermost. If this is neglected, and the nuts are placed with the unfinished side against the washers, broken bases will surely ensue. The uneven surface that nuts so placed present against the rail causes them to move laterally under the pressure of being tightened, and as a result the bases snap like punk.

Indiscriminate jumping about a section, doing a frame here and a frame there, should be avoided in spindle changing. Work along systematically, from one frame to another, either across the length or breadth of the section.

Using the best of the old spindles on certain designated frames may prove a good stunt from an economic standpoint. A good way of getting the better spindles out safely is to mark them while they are still running with a load, and then remove them first. Try a gauge, previously made, on the whirls of the spindles to be reclaimed, so that some approach to uniformity will obtain. And, above, all, pack the complete spindles in boxes or other containers so that the several parts will not intermingle.

Preliminary setting, or centering, of new spindles can be done with the ring-rails at the bottom of the traverse. Use an ordinary empty bobbin for this job. The small space allowance between the bobbin bottom and the ring affords an excellent guiding medium for the person tightening the bases.

Before, however, the initial centering is done, the bands are hooked over the spindle bases. To prevent mixing the spindle blades, use one hand to lift each blade, hooking the band over the base with the other. This is also a favorable moment to fill the spindle bases with oil. Remove the blade with the left hand, dump in a small quantity of oil, replace the blade, letting it settle slowly. When a base is oiled in this way, the air that becomes entrapped at the introduction of oil has a chance to escape. Raise the blade again so that about one-half of its lower length still remains in the base. Pour in oil so that the base is filled to the brim; then, very gradually, let the blade sink to its bearing. There is a certain feel and sound to a settling blade in a well filled base that a careful oiler soon comes to know. Too much oil should not be put in the base when the blade is entirely out, because the blade displaces a certain quantity which will spill over the top and trickle to the floor. Oil is too expensive for much of this sort of thing! If one has plenty of time, and a good arrangement for banking the blades, the latter can be removed and a gauge blade—an ordinary blade with its whirl jacket removed—used so that all bases are filled alike. Fig. 7 shows a gauge-blade (gb) in a base, and the manner of pouring in the oil. It is a good plan to oil the spindles

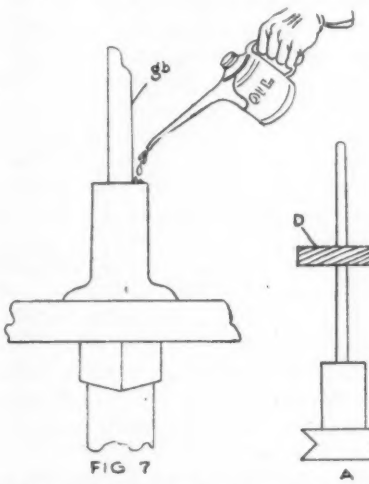


FIG 7

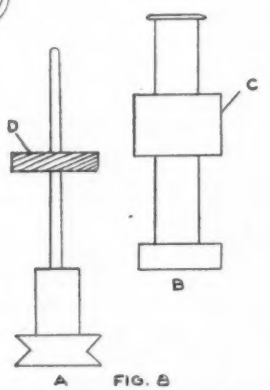


FIG. 8

again a few hours after first starting the machine, and then daily for about a week. By this time all the air has usually worked its way out.

As soon as the first setting is finished, the bands are slipped into place in the whirls. If this had been done before the bases had been tightened to the spindle rail, the pull of the tight bands would force the loose spindles toward the back, making it difficult to get the centering-bobbin properly in place. The final centering is done after the frame has been started. Half-way up the traverse is about the right place for the ring rail. The latter should be disconnected from its driving mechanism so that it remains stationary during the centering.

When one has to center, or set, spindles that have already been running (this applies equally as well to new spindles put on old frames), several outside factors enter the proposition. For instance, the ring rail lifter rods—pokers, our British relatives term them—may be worn a bit, or the wear may be in their bearings. Overhanging rails, of the individual ring plate type are particularly inclined to this trouble if the wear is not early attended to.

All final centering should be done with the spindles

running. There are several ways of gauging for concentricity of rings and spindles. Among them are the disc method, and the system using a bobbin fitted with a collar that nearly fills the ring. Fig. 8, at A, shows the disc (d) on a spindle blade; B illustrates the bobbin gauge. Sometimes the collar (c) on the bobbin in B extends along the entire barrel length.

In the regular routine of centering spindles, a practical time for this work is just before a frame is to be doffed. The bobbins are then nearly full, and form first-class gauges minus the trouble of handling them. This method is especially applicable to the warp wind traverse. Do the centering when the ring rail is near the center; for in this way any slight deflection of the spindle is equally divided between top and bottom of the traverse.

Twister spindles generally have that part of the bases above the spindle rail fitted with two flat sides so that the base can be firmly held by one wrench while its nut is tightened with another wrench. If, after the base is tightened, the spindle is out of center to the right or to the left, one wrench may be used as a drift to drive the spindle this way or that.

It often happens in the course of time, that the pull of the bands, together with the steady vibration of the running machinery will cause the nuts to loosen sufficiently to permit the spindles to move toward the back of the rail. When looking down at the bobbins on such spindles, it will be noted that as the ring rail approaches the bottom of the traverse, the bobbins will rub against the rings. There arises at such a time a grinding noise, unmistakable once known. Fig. 9 shows the condition and needs no further explanation. To get such spindles back to the center again, it is necessary to first loosen the nut a trifle, then to grasp the base with the left hand and pull the spindle forward, gauging the center with the eye, and re-tightening the nut. It is easier to adjust the spindle if it is too far forward than when it is back of the center. In the former case, simply place one wrench against one side of the spindle base, tap this improvised drift with the other wrench, moving the drift wrench from side to side to push the spindle toward the middle.

As has already been stated, the full bobbins make ideal gauges for the eye to judge by; one soon becomes very adept in this method of centering spindles. Occasionally one strikes a spindle that is inclined away from the perpendicular. No amount of juggling backward and forward, or from side to side seems to bring it right. In such a case, papering is often the only remedy. Insert a small piece of paper under the offending side, re-tighten the nut, and tap the spindle to center. If the paper does not give a sufficient throw to the spindle, double the thickness; on the other hand, if it throws too much, split the thickness.

Creeping of bases when tightening the nuts is a disagreeable difficulty that occasionally bobs up. Sometimes by simply using the top wrench to prevent turning of the base and at the same time pulling steadily on the latter, while tightening the nut, the slippery spindle can be successfully anchored where it belongs. For spindles fitted with knee brakes, a specially shaped wrench is needed, since with the brakes in front, a regular wrench cannot reach the nuts.

"What 'm I goin' to do here," asked a section-hand of his overseer. "I've pulled the spindles forward as far as they'll go, and yet they rub on th' back."

The rails were of the overhanging type, the lifter or poker bracket being in back of the spindle rail. Observation indicated that the trouble was present at both the uppermost and the lowest points of the traverse. The spindle itself was evidently truly perpendicular! The perplexity was solved by putting a hoop iron packing at 1 and 2, between the lifter rod bracket (b) and the spindle rails (r), Fig. 10. This procedure pushed the end of the rail back so that the spindles could be made concentric with the rings. Perfect concentricity of all spindles and rings is of course, never fully achieved in practice; nevertheless, it is well to head one's aeroplane toward a star.

"I don't see why I can't use a truck to sit on when I center spindles," a young man complained.

"Because you're not able to look straight down on the spindle when you sit on a truck," answered the boss; "you only see the side movement of the spindles."

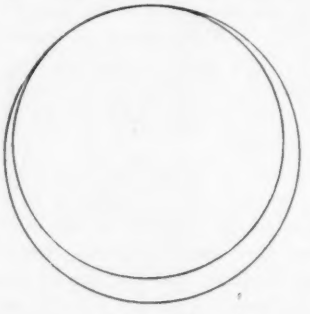


FIG 9

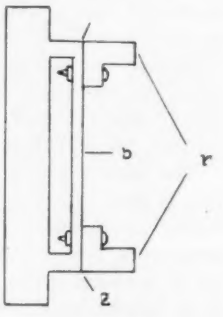


FIG 10

This is true! In order to size up the spindles from front and back as well as either side, one must be right over them. This requires the person centering to adopt a standing posture.

"And will that poor fellow have to stand like that for hours at a stretch?" may well be asked of the boss. For the centering of spindles in this attitude is certainly one back-breaking business.

A compromise may be effected by permitting the use of a truck to sit on in a preliminary centering, getting the spindle right as regards the sides. After this, the front and back deflection should be looked for standing up. Another thing! Beware of the chap who sleeps on the truck—whether his eyes are open or shut—tapping the spindles right or left, regardless of whether they need it or not, never getting off the truck to see if the front or back is right.

Care and Repairs.

Spindles, like everything else on this mortal vale, require care. Obviously, new spindles give the least trouble. Once they are thoroughly oiled and have broken themselves into their best running bearing, no trouble may be anticipated for several years at least. But with the certainty of death and taxes, the old age of spindles creeps on, and all at once, it seems, the spindles become a thing of worry.

Now, in order that any situation connected with the repairing of defective spindles can be immediately handled, the necessary tools should be at hand. Of these the most important are: upper and lower base wrenches, hammer, hook for fishing out the bolster, chalk or colored crayon, screwdriver, oilcup, piece of waste, and a pair of "gas pliers."

Perhaps the most common ailment of aging spindles is shakiness or vibration. Vibration is caused by bent blades, worn bolsters, worn pin for locking the bolster in the base, broken bolsters, lack of oil, and so on.

Development of one's analytic abilities for quick diagnosing of the actual reason for vibration is worth the trouble. To illustrate: a bobbin is seen vibrating quite a little. The bobbin is removed, whereupon it is noted that the spindle is now running smoothly. This smoothness is further tested by contact with the tip of the forefinger and thumb. All serene! An empty bobbin is next substituted; or, one that is running well on some neighboring spindle may be used. This bobbin runs fine. So the first bobbin, the shaky fellow, is tried again. It still shakes! Now, what's the matter? If, as some men might have done, we had gone at that spindle hammer and tongs, after seeing the bobbin shake, and had ripped out the blade, and yanked out the bolster, and muddled and puddled, and slammed back the bolster again, then dumped in a pile of oil, and jammed in the spindle blade, jerked on the band, punched on a fresh bobbin, finally standing back and looking over the smooth running bobbin, what would have been the result?

Why, that we had wasted all that good time on a perfect fitting, perfect running spindle. There was nothing the matter with the spindle! Pick up the shaky bobbin. Look down into the barrel from the small end. What does one see? Instead of a true circular opening that fits fairly snug to the spindle top, we note an oval, or else a hole so enlarged that vibration is an unavoidable accompaniment.

Thus is the need of the analytic habit made evident. Just as soon as a shaky bobbin is to receive attention, remove the bobbin, look at the spindle, feel of its tip. If it runs smoothly, examine the bobbin. Should the upper hole appear normal, inspect the lower end. Too great an enlargement here causes vibration, which, if very pronounced, may transmit itself to the top in a lesser degree. That type of spindle which has a special ferrule attached to the blade gives trouble with this lower end vibration when the ferrule becomes detached. The relation of a blade minus its ferrule is to the normal opening of the bobbin just exactly what an abnormally large opening is to a fully equipped blade—the excess space between spindle and bobbin, in each case, causes vibration.

To continue the diagnosis. If an examination reveals both top and bottom of the shaky bobbin in apparently the customary shape, and, furthermore, if the spindle also seems to run smoothly, the chances are that the oil in the base is low. Oil forms a cushion for the bolster which has a certain amount of freedom at its lower end. Always have an oil cup handy. Pour in a quantity of oil and test the bobbin again. Presto! it is running flawlessly now. It may not be exaggeration to say that practically all the vibration due to enlarged bobbin openings may be attributed to neglect in the testing of newly purchased bobbins, or in faulty reaming of old bobbins.

A bobbin that fits the spindle so tightly that it seems to have been driven into place with a hammer may create a vibration, especially if the oil is low in the base, or the bearing parts of bolster and blade are slightly worn.

Assuming now that a shaky bobbin has been lifted off its spindle, and that the latter gives visible evidence of vibration. Occasionally, the trouble may be remedied, if it is not severe, by putting oil in the base. It is well, as a rule, to precede any spindle fixing with a dose of oil. However, should the vibration still continue, pull out the blade and examine the bolster opening. If it is anything but round, (oval, for instance), scrape it, and insert a new one. Even if it looks all right, some wear may be there; so that it is advisable to put in a new one and test the blade. Should the spindle run smoothly, it proves that the old bolster was at fault. Destroy all such defective bolsters immediately to prevent their being used again in the future.

But if the vibration fails to stop even with the new bolster, it can be taken for granted that the trouble lies in the blade itself. In some way, either through being hit by some object, truck, or so on, or through the lateral yanking that takes place when a tight bobbin is removed, the blade has been bent. Put back the old bolster, slip on the band, hold a piece of chalk or crayon against the tip so that contact is made at the point farthest from the center of gyration. Grasp the revolving spindle at the jacket, retarding its speed until it becomes stationary with the chalked point in front. A quick tap with the hammer at this point follows. Experience will teach just how hard to hit the spindle—a minor vibration requiring but a gentle tap, a severe one a sharp rap. One soon acquires the ability to accurately gauge the force so that only one or two blows are necessary to right the blade.

Quick results are sometimes attained by tapping the tip of the running spindle with gentle hammer blows in rapid succession. Again, one may hook a forefinger around the tip, after having first stopped the spindle with the deflection in back, and pulling forward, bring the blade to its proper place. The chalking method, however, is more scientific and is therefore to be recommended.

Overfilling of bobbins is a fruitful cause of temporary spindle vibration. Obviously, a too frequent recurrence of this temporary vibration will tend to wear the bolster, eventuating in a permanent disturbance.

That peculiar wobbling movement of a bobbin caused by a revolving bolster, and so different from the staccato-like motion of the ordinary vibration can never be mistaken when once known. The spindle moves in a wide orbit, with a spasmodic motion identical with the wobbling of a top coming to rest. The trouble is due to the locking device failing in its function of keeping the bolster from revolving. Only a renewal of the lock contrivance will overcome the trouble.

One may, in the course of time, have to deal with a spindle that refuses to be driven by the band, tight as the latter may be. In the type of spindle having an adjusting step to the bolster, a part turn of this, by raising the blade will often remove the difficulty. The binding, however, may result from dry bases, the bolster clogging the blade with a coating of thickened gum. In such a case, the removal of the blade and bolster is necessary. Often the bolster will cling so tightly to the blade that a pair of pliers or insertion in a vise may be necessary to remove it. A thorough cleansing of the base, as well as the bolster and blade should follow to remove all grit. It may be advisable to substitute a new bolster, the old one, as likely as not, having, through lack of oil, become ground out of true.

Sometimes the free movement of a spindle will be checked on account of a band breaking and lapping itself around the base under the jacket, thus retarding the spindle. How-

ever, this difficulty is easily located, since the cause becomes visible as soon as the blade is raised a bit from the base.

Oiling.

Systematic oiling, it cannot be too strongly emphasized, is essential to the longevity of spindles. A little and often, furthermore, is more advisable than dumping in large quantities and going the limit. Better to oil every 6 weeks when the limit is 8, than to run the risk of having a ruined bolster or blade, when in the oiling a spindle is skipped here and there. As a matter of fact, always have a responsible person do the oiling himself, or have him personally follow up the oilers. Oil is to a spindle as food to a person——withhold it, and unending trouble ensues.

Oil cups may be of the spring bottom style shown at A, Fig. 11, or some form of the kind indicated by C, Fig. 7. Spring oil cups are good on the spindles whose bases are fitted with oil nozzles. The type at Fig. 7, whose stem allows a free, continuous flow of oil is adapted to the oiling of those spindles that require the band to be slipped off, or whose blades are forced up and held tight in this position by the bands, as illustrated by Fig. 12—in short, that class of spindles without the oil spout.

Frankly speaking, to be on the safe side, it is well to raise all the spindles in this way occasionally, even if they are equipped with the oil nozzle. This latter method of

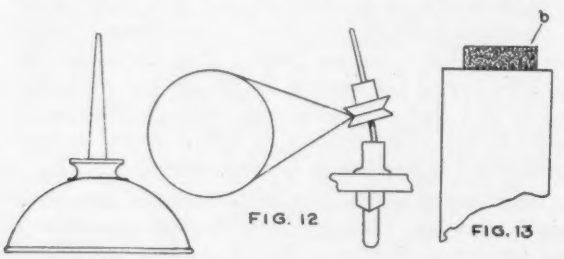


FIG. 11 FIG. 12 FIG. 13

oil introduction to the bases is far from perfect. It will pay to keep tabs on this point. Just the moment that the oil does not reach the base in sufficient quantities, or the bases get abnormally hot, and the blades commence to vibrate slightly—just from that moment do the oiling by the old method of raising the blades. A stitch in time saves nine, remember!

Oilers should be taught to discriminate between wrong and right oiling. Under the former may be classed too little oil, too much oil, carelessly pouring of oil over everything else besides the bases, and so on. The right way is to tip the oil cup forward so that the oil enters the base. As soon as the latter is filled, a quick upward movement of the hand brings the nozzle of the oil cup to the non-flowing stage, and it is moved to the next spindle. An expert oiler can proceed from spindle to spindle without losing a drop of oil. A piece of waste should be part of the oilers' equipment, in case of an accidental spill. The oiling can be more expeditously done when the oil cup moves toward the oiler rather than away from him.

Only the best grade of oil should be used. Vegetable, animal, or inferior oils tend to gum up the spindles, necessitating extra power to drive them, not to mention the disagreeable feature of cleaning out "stuck" spindles.

It is now not usual to pump out dirty oil from the bases. In some of the earlier types of the self-centering spindle, a removable base part or plug was made, but the modern spindle is so constructed that a space intervenes between the lower end of the bolster and the bottom of the base. In this the sediment, small when a good quality of oil is used, and used rightly, settles.

Broken parts should be attended to as soon as possible, for the sake of production. A very common cause of broken bases is the ubiquitous truck. If spindles are fitted with brakes which extend so that there is a possibility of trucks damaging them or the spindles, a fender of some kind should be provided to keep the trucks a safe distance from the spindles.

Bolsters are often broken in that type of spindle whose holder-down is easily detached, permitting the blade to be drawn up an inch or two when removing a tight bobbin. Since a lateral movement is necessary to get the bobbin off the spindle without striking the thread-board, the quick side movement thus engendered tends to snap the bolster

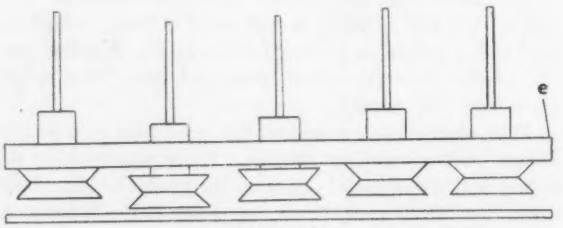


FIG. 14

which is usually brought up with the rising blade. Broken bolsters can usually be distinguished because the spindles affected are much lower than their neighbors.

Bolsters prove troublesome in another way in those spindles having a defective blade lock. For instance the blade may be pulled up, carrying the bolster (b) a short distance with it, say a half-inch or so, Fig. 13. The bolster in its ascent turns a part turn, and in the event of being forced down, as is the case where the workers try to push the blade back into place by means of the bobbin, the bolster is so wedged that it will neither rise nor drop. Sometimes, such a bolster cannot be dislodged with unaided fingers. In this case the hook can be used. Or, a pair of pliers, such as are commonly designated as "gas pliers" will be found very handy for dealing with this emergency.

Renewal of bolsters is sometimes necessary on the non-adjusting type when the bolsters wear, letting the spindle blades drop from their normal level. A rule or other straight edge (e) placed across the top whirl flanges, as at Fig. 14, will readily disclose this trouble. Such spindles make a badly filled bobbin on warp wound frames. It is a practice of rather doubtful nature to bring these depressed spindles up to line by means of cardboard or leather packing, because it is almost impossible to level them evenly. New bolsters make a better job, and without the annoying possibility of tipping the spindle out of alignment that usually follows from uneven packing by careless people.

At this point it may be well to say that extra spindles should be kept on hand. Complete spindles as well as those parts which experience shows are frequently broken. Production should never be held up for want of a spindle, or a part of one.

Whirls finally wear even if the blade and bolster are still capable of further good service. Worn whirls, of course, result in an increase of twist above the required

(*Continued on page* 479.)

Management Applied to Textile Plants*

BY GEORGE S. HARRIS.†

The general subject of management has always been an interesting one, to my mind, and I believe that during the next few years managers as a class all over the globe are to meet trials never before encountered. We are all familiar with the three-legged table supporting industry—the labor leg, the capital leg and the management leg. It is generally conceded that no three-legged table can stand on only two of its legs, but occasionally we hear of a labor leg somewhere deciding that his particular table is fully able to stand without the management leg, or in some cases the labor leg feels that the table might be more substantial if we take some of the stock out of the management leg and put it into the labor leg. Naturally the table is weakened directly in proportion to the amount of stock removed from any one of the legs.

GEORGE S. HARRIS.

Management, to my idea, is more or less a matter of compromise and it is just as erroneous to uncompromisingly dictate to men without feeling their sensitiveness, as it is to attempt to twist a cotton fiber in a way it will not twist without damage.

Men—and of course I mean men who have not been advanced beyond their capacity—should feel their responsibility and should be allowed to work out their problems in their own way. A manager to stand firmly as such must have had the necessary experience in all the various departments, and he finds it difficult at times to see an assistant apparently wasting time by taking a circuitous route to an object, but the man should be allowed all possible leeway and be checked only when he is about to do some real damage. It is to my mind poor management to feel that every man must be made to do my way. Unless a man is given an opportunity to try out his ideas without fear of being discharged for mistakes, he stops thinking and becomes a machine.

Men should be taught to feel that it is their duty to train other men. They should be taught by the management that their advancement depends always upon their having ready an understudy. I recall reference in a paper once to the "three point system of promotion" and have always remembered my impression. Picture an organization from manager down where each man in line is trying to promote himself by making the man ahead so good that he must outgrow his shoes and at the same time training an understudy for his own work. There is an ideal organization.

When a vacancy occurs a good man will comb thoroughly his own organization before going outside, but I don't think a manager should ever promote a man unless that man can show that one or more of his assistants is ready for his work. When a man is fully filling his part in an organization he is continually pushing forward the man just ahead and pulling the man just below. No man, regardless of his competency, should ever receive promotion who has ever attempted to drag down another in his organization or in any manner attempted to interfere with his progress.

Plant managers require the full loyalty and attention of every man on the staff, and a manager who does not possess that personality so necessary to develop loyalty and interest in his assistants, is surely unfortunate and so are his stockholders.

There is hanging on the walls of my office a card bearing this inscription by Elbert Hubbard: "Men are valuable just in proportion as they are able and willing to work in harmony with other men." Please get this firmly in mind. Several years ago I had copies made and posted them throughout our plants and have been interested in seeing its effect on the men. I commend this to employee and employer alike as carrying a lesson well worth any man's careful consideration.

In industrial management today we have two extremes. On the one hand an uncompromising autocrat who sits at the head of an organization dictating without regard to the thought or feeling of the men in charge of departments, and on the other hand the recently developed industrial democracy with the governmental bodies of men from the works either appointed by the head of the establishment or elected by the workers en masse, or both.

I feel that either one of these extremes is just as bad as the other and both with few exceptions will eventually go on the rocks. I have more tolerance for the industrial democracy plan of management than the autocratic management, but neither is good nor necessary. Somewhere between the two, ideal management is found.

Here you find a man firmly in his position by reason of his personality, capacity and training. He knows his work and can intelligently direct with an understanding of the difficulties ahead of the men when they attempt to carry out his instructions. He is naturally careful and thinks out his plans after discussing details with the men who are

† President, Exposition Cotton Mills, Atlanta, Ga.

* Extracts from a paper presented at the Spring Meeting, Atlanta, Ga., May 8 to 11, 1922, of The American Society of Mechanical Engineers.

ultimately to do the work. This is not possible for any man to do before he has mastered details in the plant. An industrial plant is not a military establishment and cannot be successfully handled as such. The main object in any army, it seems to me, is to "pass the buck," while in industry every man in authority should be prompt to stand firmly on his responsibility and never attempt to shift his burdens to others.

The industrial democracy idea is pleasant to think about as it carries beautiful ideas of the brotherhood of man, etc., but human nature is the same the world over and in my opinion this plan generally will not succeed. There will be found an occasional exception where local conditions or some man or men in the organization are gifted with certain qualifications that make it all a success. But these exceptions are and will be rare. Men of today have developed through a long process of the "survival of the fittest" and the result has been a certain amount of selfishness in all men. Those who had no selfishness in their make-up and insisted upon giving away to others everything they gained, were stamped out before our day and left no posterity.

It has been suggested that you might be interested in a few ideas on the development of cotton manufacturing in the South as compared to that in other sections. As you know, for a term of years our development was phenomenal until today the cotton growing states are making into yarn or cloth considerably more than half the cotton manufactured in this country. Of the 37,000,000 spindles in the United States, the cotton growing states have 16,000,000, or more than 43 per cent. The mills of the cotton states are now consuming 55 per cent of the cotton consumed in the country, with a steady increase. This has been accomplished in comparatively a very short time and it might be interesting to see how it was brought about.

Before the successful development of the humidifying apparatus, cotton mills were confined to certain localities in which could be found natural atmospheric conditions permitting weaving and spinning. This very largely accounts for the mills of England and later those in our New England states. In the southern states the hot, dry summer so necessary to the growth of cotton did not encourage the spinner and the few mills we had in the old days were located on the banks of rivers for the dual purpose of supplying power and natural humidity. Some mills were scattered over the South, but the real growth was in New England.

In 1881 a few leading citizens of Atlanta conceived the idea of creating something that might stimulate cotton manufacturing and the result was the Industrial Cotton Exposition. This was held in Atlanta and exhibited everything from the cotton growing in the field to the finished cloth, with the actual manufacturing being demonstrated. As a finishing feature a real wedding ceremony was performed in the building with both the bride and the groom wearing clothes made of cloth produced with the machinery on exhibition from cotton grown in the surrounding fields. Immediately following the close of the exposition a new company, the Exposition Cotton Mills, was organized and began the manufacture of cotton goods on a commercial scale in these same buildings and from this nucleus the present Exposition Mills have grown.

As the real growth of mills in the South dates from a time soon after this exposition, it seems fair to assume that it was quite largely responsible for this growth and those of us who have the honor today of occupying official positions in the Exposition Cotton Mills feel proud of the part our mills played in the development of our industry. We have today, framed in our office, one of the original certificates of the capital stock of the International Cotton Exposition. More than this, a part of our present equipment is now running in the original wooden buildings that housed the exposition.

The development of southern cotton mills was assisted greatly in later years by the perfection of humidifiers which made it possible to build a mill anywhere and operate it successfully through the summer months.

It might well be asked why the southern mills advanced so much more rapidly than those in any other section, and I will attempt to answer, in part at least. We will take for comparison a mill in Georgia and another in Lowell, Mass., without any intention of discrediting what has been achieved by our friends of New England. As a matter of fact, we of the South marvel at their ability to show such financial results under their conditions.

First, in the matter of cotton the Georgia mill has the advantage. When the mill in Lowell requires cotton it first deals with a local broker who will probably place the order with one of the many cotton shippers maintaining a large organization covering more or less the entire cotton belt. These shippers in turn will buy the cotton from smaller shippers operating in one locality who might buy direct from the producer or from a merchant who has taken in cotton on account of supplies furnished during growing season. The cotton, before it can start on its journey, is concentrated at some point for compression. Here it receives considerable handling and is compressed to a high density. By the time it reaches New England it not only has accumulated a very high freight charge, but the percentage of tare has been increased at the compress.

In contrast to this long process with its three to four necessary profits, the Georgia mill will buy generally from the local shipper and might buy directly from the large responsible producer, with transportation cost usually only a few points. In addition to this the mill in Georgia can handle uncompressed cotton, saving the extra tare and expense incident to compressing, besides the extra mill expense in opening compressed cotton. I have never been in a position to make a dollar-and-cents comparison of this cost of cotton, which would naturally vary with the seasons, but the difference must always be there and in some seasons it must be considerable.

The labor cost has always been in favor of the Georgia mill, due as much as anything else to climatic conditions. The long, hard winters of the North necessarily make the cost of living very materially higher, which must be borne finally by the manufacturer in his pay rolls. In the South from the beginning the mills found it necessary to provide homes for the operatives as this proved to be a decided economic advantage, both to the mill as well as to the operative. The village plans today are given the same consideration as the mill plans in the original layout. This has given the operative a far more comfortable home at a much less cost to the mill than if supplied by outsiders who haven't the same interest in the operatives or the mill. Furthermore, this scheme of things has tended to keep

the relationship between employer and employee closer. Contrast this with the operative in New England who lives in a house probably one or more miles from his work and which he rents from a landlord who has no interest in him beyond that of keeping his property occupied profitably.

There was a time when this was very largely offset by the higher efficiency of the labor in Massachusetts but this advantage has now been shifted about. With every year, our labor has been growing more and more efficient while the origina. labor of Massachusetts has been replaced each year at a steadily increasing percentage, with untrained immigrants. I recall my first day in Lowell as a boy where I went to take courses in the Lowell Textile School. Standing near a mill gate at noon and observing the help passing out, I had to listen carefully to hear the English language spoken. Instead what I did hear was, as it seemed to me, every language of the world. I learned afterwards that twenty-six different nations were represented in the mills of Lowell at that time and that was more than twenty years ago. This, together with the advent of labor organizations, has created a condition that tends toward anything but efficiency.

In contrast to this, in a Georgia mill is a class of labor, all American, recruited from the farming class. The manager has grown up with them and knows them in their homes. In many cases the mill, being a comparatively young institution, was built from a small unit by the present owners. The manager, living in close touch with the labor, is in a position to talk freely with them. I know of instances in Georgia, during the recent depression, where values depreciated so fast that it was impossible for a mill to continue operating without tremendous losses, but the employees quickly sensed the entire situation and voluntarily submitted to reductions in their pay in order that the mill might continue to operate. Do you hear of such actions in the union-ridden mills of New England? I have not. The result is that while the Georgia mill is in a position to sell its product today in line with the depreciated value of raw products, the New England mill has its manufacturing cost held up fictitiously and is forced to take heavy losses in current values or shut down.

In conclusion, allow me to reflect back to the legs supporting industry, with special reference to the management leg and American industry. Do you fully realize your responsibility during the next few years? It is up to the management to attract, hold and keep employed labor and capital. They are both free and when management fails to function they both withdraw and industry becomes stagnant. Our recent road has been a hard one, and now the capital is here, the labor is here, but world competition is also here, and it is going to take brains, and active brains in the heads of management to direct capital and labor so as to place American industry in the front ranks and hold it there.

A special bulletin on two recently developed colors, National Superchrome Garnet Y and National Superchrome Red B, has been issued by the National Aniline & Chemical Co., Inc. These two types are specially recommended for all classes of woolen and worsted goods, where fastness to light, washing, fulling, potting or carbonizing is desired.

Spindle Selection and Care.

(*Continued from page* 476.)

standard in the product of the machine. On account of the varying band pull that spindles are at times subjected to, and probably for the reason of a difference in ability to resist wear, the whirls do not all wear evenly. Calipering discloses a wide range in the diameters of the whirls. Naturally, the variation in the twist inserted in the yarn is magnified by such a state of affairs. Whirls may wear so far that a tight band newly put on will break through, causing the lower flange to drop to the spindle rail. Worn to such fragility, the whirls are susceptible to the slightest jar. When whirls have an excessive wear, it may be necessary to change the twist gear, making it one tooth, or so, larger, to bring back the twist to normal. If, however, there is a great variation in wear, it may be advisable to go over them with a special sized gauge, so that spindles nearest a certain size can be put together. But beware of false economy! Scrap spindles before irretrievable damage is done.

Spindles of the type whose blades have a pointed end (e), Fig. 15, running in non-adjusting steps may show signs of wear at this point. Often the wear will be between 1/32nd and 1/16th of an inch. Spindles that get to this stage have outlived their usefulness, and should be immediately discarded when found.

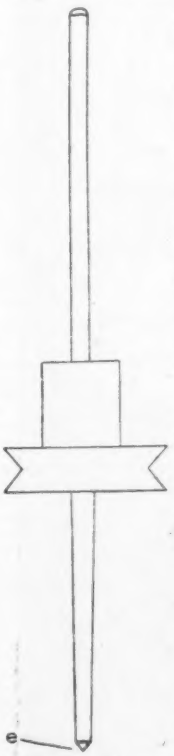


FIG. 15

The life of spindles naturally depends upon the speed at which they are run, the load they carry, the care they get, and somewhat to the extent to which renewals of bolsters is practical. When the blades get into such shape that they vibrate regardless of what one does to obviate it, then the time has evidently come for the introduction of new spindles. Increasing the speed, or the length of the bobbins after spindles have run several years often serve to bring out vibrations that simply refuse to subside. Systematic oiling carried out in periods, the frequency of which should increase as the spindles grow in years, will do much to carry the spindles to a useful old age. Mishandling of the spindles, such as jamming down bobbins on revolving blades, pulling blades one side to stop spindles, and similar abusive practices should be frowned upon in no unmistakable manner. Tight fitting bobbins, also, do a deal of damage in that the bobbins are forcibly pounded to place with a spool or other handy implement, and do even more harm when a strong arm chap yanks and pulls this way and that way to remove the recalcitrant bobbins.

Lastly, much of the success of spindles depends upon the attitude taken toward them. After the proper type of spindles, best adapted for the work they must do, has been secured, the one big factor in the attitude should be: are we taking every possible care of them?

Testing the Strength of Cotton Yarns

BY A. TESTER.

Testing yarns for strength seems to be the favorite indoor sport of buyers these days. That is, from the amount of attention given this detail of their purchase, users of cotton yarn are certainly anxious to know what it will pull. Since the beginning of the industry, the strength of the manufactured goods has been of prime importance. However, the tremendous growth of the world's spindles has far outstripped accurate knowledge concerning the best methods to be used in ascertaining the strength of yarn. Particularly is this true of the vast number of weaving mills who purchase their material ready for the looms.

This article is primarily for the benefit of those buyers of yarn who wish, in a simple way, to accurately determine the tensile strength of the warp which they purchase. For the informed mill man it will hold little that is new.

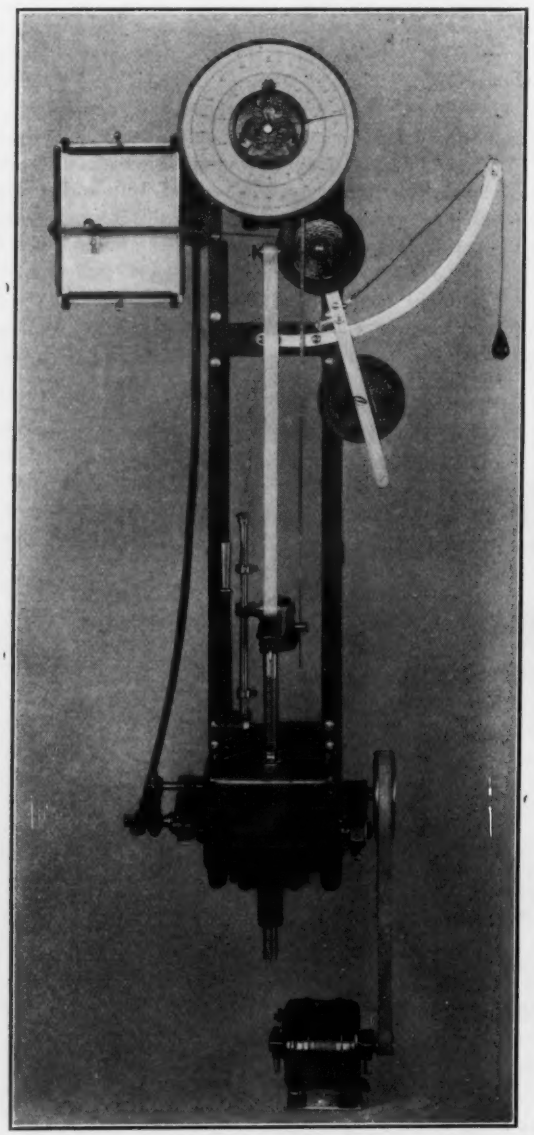


FIG. 1. A SKEIN OF YARN ON THE STRETCHING SPOOLS OF A TESTING MACHINE.

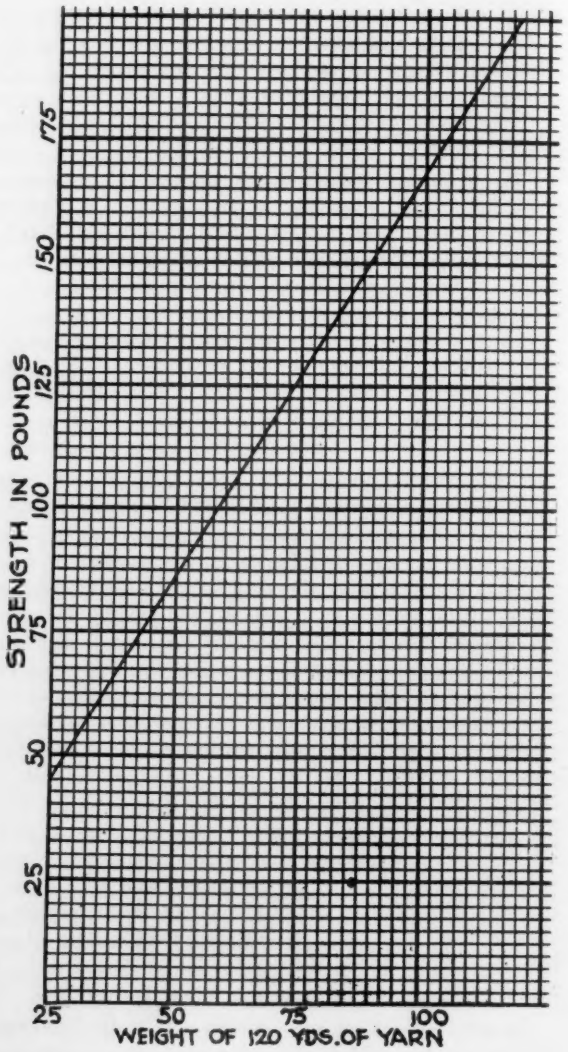


FIG. 2. A CURVE SHOWING THE RELATION BETWEEN WEIGHT AND STRENGTH.

The strength of yarn is understood to refer to the weight in pounds necessary to rupture a given number of its strands, or their ultimate strength. For single yarn, it is customary to break 80 wraps of a 54-inch reel. This is equivalent to 120 yards or one lea. Since there will be 80 strands on each side of the elongated skein, there will be 160 strands under tension. The skein should be reeled carefully and with an even tension throughout the entire length. When 120 yards have been reeled, the ends should be tied with a weaver's knot. If the skein is to be broken with its normal moisture content, it is placed on the spools of the testing machine and its strands flattened out, so as to have the same tension on each and equally distribute the burden of the load. Figure 1 shows a skein of yarn on the stretching spools of a Scott tester. The chart at the

left is a desirable attachment which records the stretch and strength of the specimen tested.

When the skein is broken and its strength recorded on the test report, it should be weighed, taking care that every thread is gathered up from the testing machine. The reason for weighing after testing, is to avoid deranging the skein and pulling some strands out longer than others. This would cause them to rupture first and the test would show an incorrect result. A strength test without the weight of the yarn, is not worth the paper on which it is written.

The strength of the yarn varies directly as the weight and indirectly as the number of the yarn. Figure 2 shows a curve of the relation between weight and strength. This serves to emphasize the necessity of knowing the size of the yarn which has been tested, even though there is only a slight variation of the number. The writer has heard of a large order of cotton warp which was supposed to have been bought on a strength comparison. The tests which determined the strength were made with no regard for the weight of the yarn. The goods to be bought were 2s 5 ply and the successful bidder presented a sample which afterwards was found to be 6.25s 5 ply. Such is the status of the art of testing among the buyers of cotton yarn

It is generally recognized that the only accurate way to test cotton goods is to first dry out all the moisture. Moisture plays a leading part in the strength of goods, for one per cent moisture regain adds six and one-half per cent strength to the goods. Figure 3 illustrates the varying strength of the same material with different moisture contents. The bone dry test need not be resorted to for the ordinary run of tests, however, since the regain of cotton goods is known for various humidities. It is, though, quite essential that the breaking strength as shown by the tests be adjusted for the same moisture content. The following formula is used in making the adjustment calculation:

$$\text{Tensile strength corrected to 6.50 percent moisture regain} = \frac{\text{Machine reading} \times 139}{100 + (6 \times \text{actual regain})}$$

This is the formula recommended by the American Society for Testing Materials' Committee on Textiles.

The actual percentage regain can be approximated by reference to tables showing the regain at various percentages of relative humidity. The degree of relative humidity to which the samples have been exposed for several hours is ascertained from the wet and dry bulb thermometer.

Plied yarns may be tested in the same manner as single yarns. But it is not generally the custom to use 80 wraps

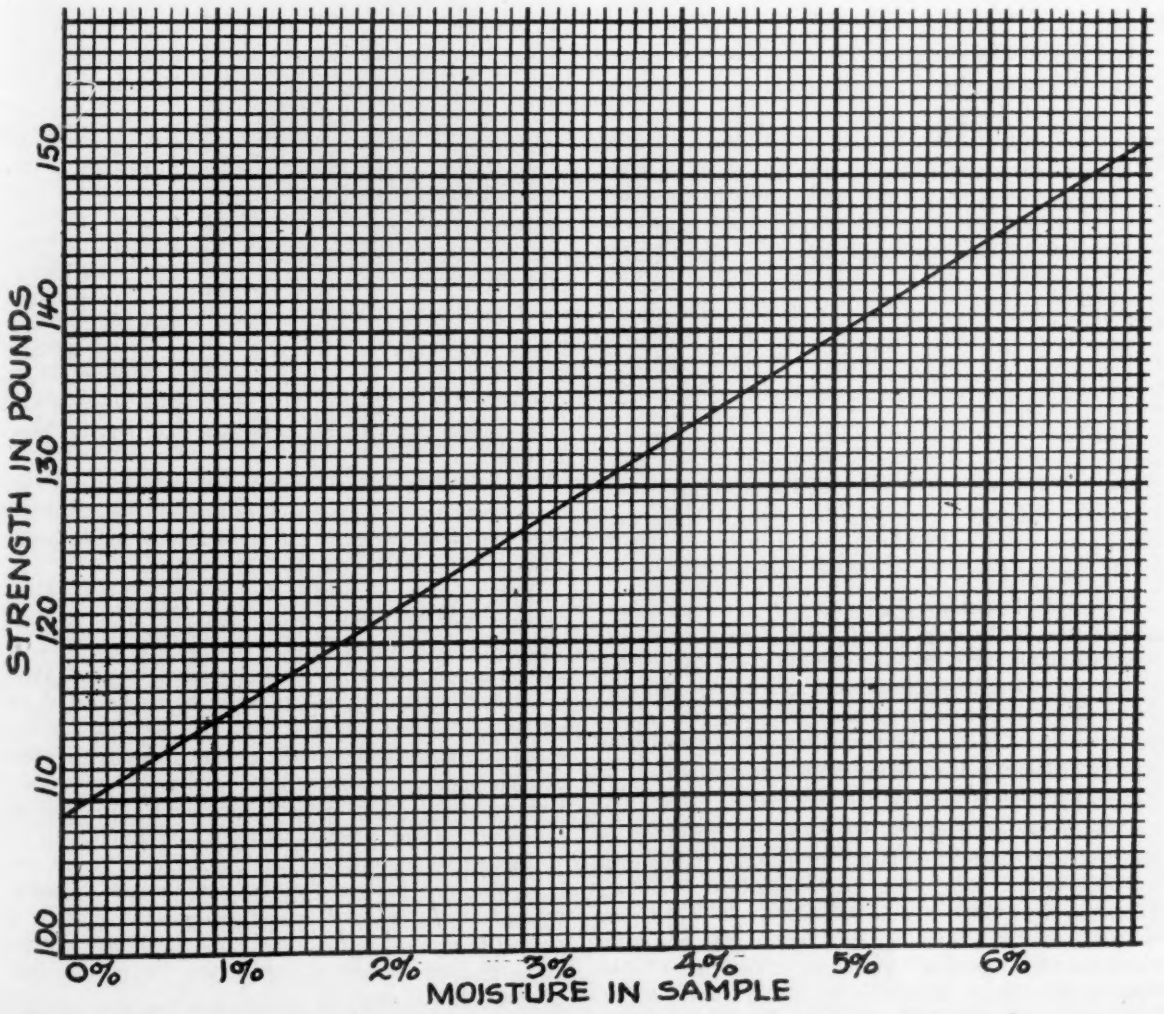


FIG. 3. A CHART ILLUSTRATING THE VARYING STRENGTH OF THE SAME MATERIAL WITH DIFFERENT MOISTURE CONTENTS.

of the reel on account of the limit of the testing machine being below the breaking strength of the yarn. Some testers use six wraps, some use ten, and some use fifteen, for the purpose of comparing specimens. There is a great need for standardization at this point. For this reason, it is very desirable that buyer and seller be acquainted with each other's method of testing and make their tests in the same manner. If tests are made differently, there is a probability of being unable to arbitrate a dispute over goods failing to come up to specifications.

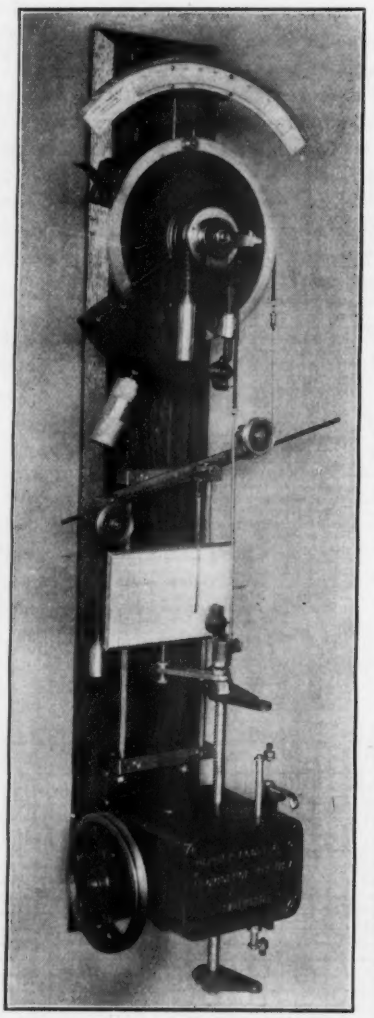
If plied yarn samples are to be tested by the skein method, a few extra precautions are necessary. The knot should be tied tightly and its ends tucked under the wraps as they pass over the upper spool of the testing machine. This will prevent the knot slipping, resulting in an incorrect test.

The best physical test from a theoretical standpoint, is the single-strand test. In the skein break there is registered the combined strength of a number of strands. It does not give accurate information as to the regularity of strength, and therefore, does not tell the weaviability of the yarn. To find the weak links in the chain of fibers, it is necessary to test a number of short lengths of the yarn. This, however, presents practical difficulties that makes its adoption quite expensive, due to the large number of tests necessary, and the difficulty of registering very small strains.

However, if the breaking strength of the specimen is above five pounds, the single strand test is the most reliable method to be used. There is an old style method of dead weight testing which should be discarded. It is the use of a weight so designed that the yarn or twine is attached to a hook at its top and smaller weights are added until the sample breaks. This test is subject to such a number of errors that it is strange that informed testers resort to its use at all. In the first place, the period of time in which the fibers are under strain varies with every break, which fact, alone, is sufficient to make the tests unreliable. Also, the speed with which the weight is lifted against gravity alters the stress to which the yarn is subjected. The lifting may be done most carefully, but it is quite hard to lift at the same speed each test. Another objection is the non-uniformity of the length tested. Twelve inches of yarn will lift a surprising amount more than twenty-four inches. Any testing that is worth being done at all deserves being done in the best way known—this is by the use of a power driven testing machine.

Figure 4 illustrates a single strand tester. A machine of this type is the only means whereby accurate testing of twines and heavy plys can be accomplished. The stretch of the material and its strength are recorded by the chart automatically in the same manner as referred to in a previous statement of the skein machine. This autographic recorder, while not absolutely essential for good testing, is quite a desirable addition to the laboratory.

The Bureau of Standards uses a speed of separation of the stretching spools of 12 inches per minute. While some buyers have their own speeds for testing, there is nothing gained in departing from this standard. It is the most widely used and there is no good reason why any other speed should be operated. Variations in speed show variations in the strength, due to the fact that the fibers are under strain different periods of time. This is another point where buyer and seller should reach an understanding and use the same speed of operation.



A SINGLE STRAND TESTING MACHINE

It has been stated that the bone dry test is the most reliable indication of strength. It eliminates the moisture variable and is the same in any atmospheric condition. All organizations engaged in the purchase or production of cotton products whose strength is paramount above other qualities, should have facilities for making bone dry tests.

Briefly, this test is made as follows: The goods are first weighed in their normal state. They are then dried out at a temperature between 220 and 230 degrees F. with a constant circulation of air through the drying oven. The material is dried until it reveals no further loss in weight. The samples are removed and their strength tested within 30 seconds after removal from the oven.

The percentage of moisture is designated as the difference between the normal and the bone dry weights divided by the normal weight. The percentage of regain is this difference divided by the bone dry weight.

Here are a few suggestions for carrying out tests: First, be sure that the samples to be compared have adjusted themselves to the same moisture content. Be sure that no sample is tested that is not also weighed or sized. Make a sufficient number of tests to learn the regularity of the strength. And last and most important, record the results exactly as they are indicated by the machine, regardless of their apparent inaccuracy, for in this way only can a true knowledge of the material be gained. An incorrect test is worse than no test at all, for it is misleading.

Testing cotton products intelligently is a worthy ambition for every buyer and seller. It will elevate the industry and take guess work out of values. Our industry is one of the greatest in the world. We should not continue our haphazard methods of determining the relative characteristics of its products.

Popular Textile Chemistry

BY JAMES A. BRANEGAN

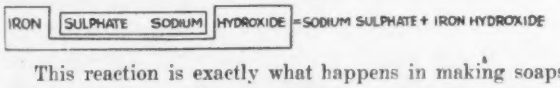
PRESIDENT, KALI MANUFACTURING CO., PHILADELPHIA.

Soaps Used for Textile Purposes.

In every line of textile work we find that soap plays an important part. In the woolen industry it is used for fulling, felting, scouring and cleaning, although recently soluble oils are being used to a great extent. Soap is used in the cotton dyehouse and also for finishing cotton, while in the working of skein silk it is indispensable, particularly in boiling off (degumming) of skein silk when the boiled off soap liquor is needed for dyeing, although in some cases the dyeing of silk must have fresh soap in the dyebath. In the degumming of piece goods and hosiery, however, "Boil-off oils" have almost entirely displaced soap, being more economical and giving better satisfaction for this class of work.

In former years soft soap which is made with a potash base was used largely by textile workers. This was due to the fact that at one time caustic potash was the only available alkali for making soap and practically all soaps were soft soaps made from a potash base. After the discovery of a process for making caustic soda cheaply, the manufacture of hard soap (caustic soda base) was pushed forward rapidly, until today practically all soaps are hard soaps. For a few special purposes soft soap is still used as is also "Fig" soap, a mixture of hard and soft soaps (potash and soda).

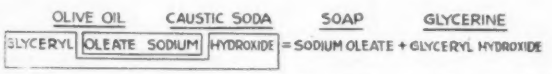
A simple definition of soap would read as follows: "The sodium (or potash) salt of a fatty acid." All dyers and chemists know that alkalis neutralize acids and vice versa and when alkalis and acids come together a salt is formed. For instance, caustic soda (alkali) plus sulphuric acid gives us sodium sulphate (Glauber salt). But supposing the sulphuric acid was already combined with iron, as "iron sulphate" now when we add the caustic soda what happens? The soda has a greater *affinity* than the iron for the sulphuric acid and replaces this iron which is set free as iron hydroxide—and the sodium and acid form sodium sulphate exactly the same salt as if straight acid and soda were brought together. This is shown more graphically as follows:



This reaction is exactly what happens in making soaps and if the reader will refer back to it as he follows this article he will clearly understand the salt formation and how these salt formations are much alike no matter if it is common salt, sal soda, tin crystals or soap.

In the manufacture of soaps for textile purposes various oils and fatty acids are used, the more common being olive oil, palm oil, red oil, (oleic acid), cocoanut oil, tallow, and cottonseed oil. Other oils such as linseed oil and peanut oil are used to a lesser extent.

With the exception of red oil which is a straight acid, all these fats and oils are salts similar to the iron sulphate, but instead of the iron we have glyceryl (glycerine) and in place of sulphuric acid or other inorganic acid we have stearic acid, oleic acid, or palmitic acid or some other organic acid and sometimes a mixture of two or three of these acids. Olive oil, a typical soap stock, is mostly glyceryl oleate a salt of glycerine and oleic acid. Now what happens when we mix the base (olive oil) with caustic soda. The soda has a greater affinity than the glycerine for the oleic acid and it sets free the glycerine and takes its place alongside the oleic acid, forming sodium oleate a soap. Compare the following with the iron sulphate reaction.



When straight oleic acid (red oil) is used the result is more positive as we have no by-products of glycerine and if the oleic acid is fairly pure and contains no tallow the combination of this acid and caustic gives us oleate of soda (soap).

Practice and experimentation has shown that oleate of soda made from straight pure oleic acid (red oil) or from an olive oil high in oleic acid is the best soap for textile purposes. Soaps made from these stocks do not harden up like soaps made from inferior fats which contain tallow or stearic acid, and it has unfortunately become the practice of some soap makers to add tallow or silicate of soda to their soaps when making in order to harden them. Both these chemicals (tallow and silicate) are injurious to textiles and the tallow particularly has a bad effect on silk. The silicate is comparatively easy to detect but the tallow is not so easily proven as being a fat itself it acts much like the other fats in the soap when the tests are made analytically. However, there is one very definite test and that is the melting point of fatty acids separated from the soaps. By this test soaps are treated with acids and heated which breaks the soaps and the fatty acids come to the surface. These fatty acids are cooled and small portions are tested for their melting point, iodine value and other characteristics and there are no two fats or fatty acids which have the same characteristics. In this manner it can be definitely settled if the fat or oil was pure. For instance, oleic acid has a melting point around 14 degrees centigrade, while the fatty acid in beef tallow has a melting point at 44 degrees centigrade, and any adulteration can be quickly detected by a careful chemist. The adulterated soap frequently has a better appearance than a straight pure red oil soap (oleate of soda) or the pure olive oil soap. For one thing the doctored soap will be harder and owing to this hardness it may have a fine grain when cut and then an unscrupulous salesman or salesmen who are ignorant of the factory processes can use the argument to the disadvantage of the maker who may be endeavoring to sell a straight soap. The textile man will find trouble with the doctored soap and try another brand and frequency with the same results, finally coming to the conclusion all soaps are alike. In periods of depression, like the present, when competition increases and prices fall, the temptation to adulterate soaps becomes greater and greater. All sorts of stocks are used such as grease from garbage plants for red oil soaps, and the writer recently found a so-called olive oil soap made from deodorized fish

oil colored green with an aniline dye and while it looked good to the eye there was trouble ahead for the dyer. It is interesting to know that there is a special green dye for coloring imitation olive oil soap.

Textile soaps are manufactured by two methods:

1. Boiling the oils or fats and alkali together in an open kettle with subsequent separation of the glycerine. (Olive oil soap is made by this process.)

2. Direct neutralization of fatty acid with alkali after the glycerine has been separated from the fat or oil. (Red oil soap or oleate of soda is a product of this process.)

By the first method the fat or oil is heated to the boiling point and caustic soda added slowly. The boiling is kept up and the soap is watched until saponification starts, after which the caustic soda can be added more rapidly. Boiling is continued until saponification is complete and the soap is "made." Common salt is then added which causes the soap to rise to the top of the kettle. It is then drawn off and run into frames and finally cut into the bars with which we are all familiar. The salty liquor left in the bottom of the kettle contains the common salt, water, spent lye (excess caustic) and the glycerine. In large factories this liquor is processed to remove the glycerine, but in small plants it is discarded. The finished soap should contain no tallow or free caustic or silicate of soda.

By the second method the oleic acid is boiled with the exact amount of alkali and saponification starts almost at once. Boiling is kept up until saponification is complete, the soap being tested from time to time to make sure there is no excess of either caustic or free alkali. The soap is then worked until smooth and run into barrels or frames. By this method there are no by-products and if the manufacturer uses pure oleic acid (pure red oil) and pure caustic soda he will have pure "oleate of soda" which undoubtedly is the best of soaps if high grade materials are used. Unfortunately, as already mentioned, some makers of red oil soap believe they can use anything in these soaps, garbage grease instead of pure oleic acid, and tallow to harden. Silicate of soda is used to cheapen the soap by making it hold water, and dyes are added for proper coloring. Free caustic is frequently left in soap through carelessness or the mistaken idea that soap should bite the tongue, and although these impure and doctored soaps have a nice appearance they are sure to cause trouble in the dyehouse.

For degumming skein silk the best soap is oleate of soda made as indicated, or a pure olive oil soap. A soap for this purpose should be free from tallow or silicate and should be neutral to Phenolphthalein. Phenolphthalein is a coal tar dye and the soap testing solution is made by dissolving one or two grams in two ounces of pure alcohol. When this is dropped on the soap it should not immediately turn color but should remain colorless or develop a pink coloration slowly. If, however, the soap turns a dark crimson at once it should be tested quantitatively for caustic as most likely it is high in free caustic soda and will prove injurious to the silk, but the soap should not be condemned by the Phenolphthalein test alone. This action of free caustic soda on silk is readily understood when we learn that silk is an *acid* and naturally reacts with the alkali to form a salt exactly the same as caustic and vitriol or caustic and oleic acid. When the silk combines with the caustic it changes both its chemical and physical condition and is tendered and otherwise injured.

From the foregoing we can readily see the absolute necessity for the silk industry to have a soap which contains practically no free alkali, tallow, or silicate of soda.

Wool like silk is an acid and the same remarks regarding soaps for silk apply to soaps for wool. For ordinary scouring and fulling oleate of soda (pure red oil soap) is undoubtedly the best and it should contain no free caustic, if more alkali is needed in scouring, soda ash or pearl ash can be added to the liquor containing the soap but caustic soda should be avoided. When the wool contains mineral oils or greases from the batching process it is best to scour with ash and a soluble oil made from cresol or phenol which have the property of emulsifying mineral oils to a high degree, soda ash should always be used with these oils. Where heavy fulling alone is desired thick soluble oils, without cresols or phenol, are mixed with ash and a comparatively small amount of water and worked into the goods until they are saturated and slippy, warm water is run into the box and the machine kept running. When the warm water is added, the oil suds up and after 15 or 20 minutes the goods are rinsed as usual, first warm, then cold. This method produces a very complete fulling. For ordinary scouring purposes, however, the oleate of soda, or better still, a high grade cresol oil is sufficient for both scouring and fulling.

Cotton is an alcohol and is not effected as readily by caustic soda as either silk or wool. In boiling cotton in the kier we use caustic soda and soda ash and frequently a little soap and kier oil. It, therefore, stands to reason that if we can treat cotton direct with free caustic soda, as in kier boiling or mercerizing, a little free caustic in the soap is of slight importance. Cotton contains a natural wax and this is softened by sulphonated oils, also sulphonated oils have the property of "opening up" textile fibers and it certainly helps the kier boil to add a small amount of high grade sulphonated oil. Knitted goods frequently have oil spots from the machine and neither soap nor alkali will remove them. In this case the best that can be done is add a kier oil made from terpenes. These are soapy oils having an odor of terpene (like varnish) and they add powerful solvents for mineral oils. They are added direct to the kier, in fact are known as "kier oils" or "bleachers' assistants," etc. There are several reliable firms making these oils.

In buying soaps much reliance should be placed on the integrity and technical experience of the soap manufacturers and it should be remembered that a doctored soap of brick-like hardness may be less desirable than a softer soap which is pure and unadulterated.

The next article will be on Sodium Nitrite and Sulphur (Brimstone).

A simple description of controllers for electric motors and definitions of the terms used in that connection has been compiled by the Electric Power Club and published in a handbook. Words which do not appear in the regular dictionaries are explained in simple language in this booklet, which, in addition to being a handbook for users of electrical control apparatus, gives the meaning of terms with which all users of electrical apparatus should be familiar. The handbooks may be obtained from leading manufacturers of electric power and control apparatus, or from The Electric Power Club, 1017 Olive Street, St. Louis, Mo.

The Southern Worker*

BY FRANK H. NEELY.†

The Odyssey of the southern worker is the story of his wanderings brought about by various economic and industrial changes that the South has undergone in the last 100 or more years. The tale is picturesque in setting, emotional in action, and certainly inspiring in its present denouement.

Scattered loosely over a large territory, we find in the year 1800 many districts whose inhabitants are artisans, come over from England, Scotland, Ireland, Germany and Holland. These people were essentially of a manufacturing turn, and made of the South an industrial country, so much so, that up to 1810 the manufactured products of Virginia, the Carolinas, and Georgia were greater in value and in variety than those of all the New England States.

FRANK H. NEELY.

This aspect continued until the invention of the cotton-gin in 1793 by Eli Whitney which changed the whole face of the picture. Almost immediately cotton raising proved of such profit that all manufacturing was stopped and the artisan had in reality "lost his job." He was not an agriculturist, but wanted a high wage for a new pursuit which he was not able to control because of different training and lack of sufficient numbers. Cotton raising was so profitable that it behooved the southern planter to acquire all the land and slaves he could, as cotton brought over 25 cents per pound during the next 40 years. The artisan was forced by this development to move farther back away from the plains, which were highly suitable for cotton raising, towards the mountains, where he formed a social group, with manners and customs of his own. He made now only the articles that he needed for the use of his family, for the slaves were taught all the homely arts that were needed for life on the plantations.

By 1860 these people were thoroughly settled near the foothills of the Blue Ridge where they became small farmers raising some cotton and grain, and carrying on small trades.

The call to arms in 1861 was answered not only by the men, but also by all boys who had reached the age of 16. After the four years of struggle, the man-power of the South was depleted, plantations devastated and neglected, railroads torn up, bridges wrecked, the whole country battle-scarred and desolate. Men straggled back to towns that were no more, living was precarious; men were broken in body and spirit, and their land and tools in no condition for the resumption of work.

Among those who formerly were in condition to help the less fortunate, there were scarcely any difference, for the whole economic and social structure had been upset by the abolition of slavery.

The emergence from this condition was necessarily slow. The transition from an agricultural country employing slave-labor to one semi-agricultural and manufacturing was difficult and the years 1865 to 1872 were unfruitful in the development of manufacturing establishments.

However, one by one, cotton mills were built, and once more, these artisans of the years before slavery, came into their own and began to be what they now are, the foundation of the cotton mill industry.

These first mills, then, and their builders were heralded at that time as the saviors of widows and children, who were largely without means of support, and the editorials of the day lauded the enterprise of these men and looked upon their activities as a godsend to the South and its population.

The characteristics of the industrial workers of the South make them at the same time good and bad factory artisans. Living largely in the mountains and by means of their own devices, they have had only such necessities of life as a poorly managed and fertilized farm would yield. Having no educational advantages, they are ignorant, in many cases illiterate; having for generations lived to themselves, they are sometimes unmoral, seldom immoral; but preeminently, because of their ancestry, they are proud. To some extent their word can be depended upon. They have common sense and are generous to a fault, yet their prejudices will sway them at times to unreasonable ends. They are improvident and wasteful, yet understand basic principles of business because of actual experience on their farms, which has taught them that they who do not produce cannot eat. It is easy for them to understand that a business may fail, because many times their crops have failed. They are of a mechanical turn of mind because of the necessity through generations of shoeing their own horses, sharpening their plows, and doing carpentry work around their own homes and those of their neighbors.

When properly approached and when they are not

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* Presented at the Spring Meeting, Atlanta, Ga., May 8 to 11, 1922., of The American Society of Mechanical Engineers.

distrustful of their leaders, they are easy to stimulate. From the time when their mode of life dated back to the period when they felt a certain aristocracy due to slavery surroundings, following through to the present day, they developed a sort of cult, and one must understand not only their present conditions, but also the conditions generations back to comprehend fully their frame of mind and overcome their strong prejudices. Their lack of training of hand and mind makes them difficult at first as factory workers, but their knowledge of the English language makes them, *when trained,* a group of the most satisfactory and able artisans.

Every point of leadership must be exerted to encourage the untrained and unlettered worker to exercise the proper effort for accomplishment. Response is not quick, but when once trained, he develops skill and ability, which added to his native *stability,* enables him to outclass in many cases the workers of other sections of the country. Manufacturers of the South have never understood that pride in artisanship is one of the prime moving forces of the southern worker. Moreover his home training has developed his respect for authority; he has lived in a patriarchy, in which the whole family follow the laws laid down by the father.

When, then, the Southerner comes to work in a factory, he already has that respect for authority which is lacking in the immigrant worker who has come to America only recently; searching, expecting and demanding freedom from every American institution, national and local, civic and commercial. The new-comer ignores the voices of his parents who have not yet learned our language and our customs, and he totally misunderstands the symbolism of the Statue of Liberty.

Foreign workers in New York, Boston, or Philadelphia, make of the factory a veritable tower of Babel, speaking various languages, unimpressed with the fundamental principle that they who would eat must work, failing to realize that the "tools belong to the hands that can wield them." They cannot be made to see that production is the source of all wealth and that buildings and equipment are of no avail unless properly organized to produce. They cannot be made to understand the parallel between the idle farm and an unproductive factory. Deceived at times by unscrupulous management, they are skeptical and distrusting, so that a satisfactory understanding with them is difficult. They are suspicious of authority, and are continually looking for injustices. Such a frame of mind constantly aggravates actual conditions. The result is an unstable working force, difficult to control. There are continual demands of unreasonable individuals; there are high training costs brought about largely by lack of understanding of the instructions given by English speaking foremen to the many-languaged workers.

In St. Louis and New Orleans we find conditions which make for better factory control as there is a stability which is due to the predominance of German and French elements. These people have been in these sections of the country for more than a generation. They have learned confidence in the constituted authority of the government and therefore in the constituted authority of organization. They can speak the language, and are more energetic and better educated and more intelligent than the southern worker. They take training quickly in particular trades, yet their "stickability" is somewhat less than that of the southerner.

The control and operation of plants in widely separated sections of the country present, then, problems of management that involve not only the differences of the men in control, but also present the differences of the individuals and the characteristics that make up the *working force.*

When we were training an army we had discipline born of military necessity. The rapidity of the training depended on the ability to discipline the soldier regardless of his type, or the locality of the training camp, and on enforced uniform methods.

If uniform results are to be secured in factory organizations, certain well-defined methods of control must be practiced. Not having the absolute power of the army, our discipline must be built on leadership, fair play, and the necessity of the plant as a whole. All workers must be judged by their performance, as shown by fair, equitable, and scientifically set standards.

When the Gantt methods began years ago to point the questioning finger at our many organizations throughout the United States, they inspired the campaign for facts, which facts every honest factory manager had to answer sooner or later. The eternal question of why the fall-down, if honestly answered, placed the responsibility upon the managerial control of the plant, and in most all cases showed that the worker was the scape-goat.

The answer always lay in planning, scheduling, disciplining, and training. The most important of these elements of good management as we view the many kinds of people in the various parts of the country, is training. It is comparatively easy to plan the work in New York or to schedule a factory's operations in San Francisco, but the accomplishment of such plans and the carrying out of such schedules is absolutely dependent upon the training, discipline, and control of the organization wherever located.

During the most trying period that the productive forces of industry have ever passed through, our experience has proved that equal results *can* be secured regardless of the locality of the factory or the type of the worker. We further know that such results only come with the proper training and that such training is only possible when all favoritism is eliminated from an organization and well defined principles of discipline are insisted upon among our superintendents.

The South needs training schools to teach all arts. Having been raised through the generation to do things in a crude manner, no artisanship has been taught to the mass The South needs leaders in the management of every industry. Specific and scientific methods of training and scientific methods of carrying on operations must be developed. The worker cannot train himself—he needs help —he needs instruction, and must have it.

Industrial leaders must be furnished by our technical schools. General education must be made available for the majority, so that the South may take its just place in the industrial world.

Boston Manufacturers' Mutual Fire Insurance Company, formerly located at 31 Milk Street, Boston, announce their removal to 185 Franklin Street, corner Pearl Street, Boston. The mail address will continue as heretofore, P. O. Box 112, Boston.

Indigo

BY WILLIAM B. NANSON.

Chemical and Physical Characteristics.

Extract of indigo, known as soluble indigo, Saxony blue, sulphate of indigo, sulphindigotic acid, sulpho-purpuric acid, sulphindylic acid, etc., consists of indigo blue in as pure a state as can be conveniently obtained, rendered soluble by means of the strongest oil of vitriol; or, better, of fuming sulphuric acid. A portion of the acid is afterwards, in most cases, neutralized and removed. Ordinary paste extract should form a tolerably consistent semi-fluid mass of a purple color, without any greenish reflection. It should dissolve in water readily and completely, without any sediment or any floating particles, and form a bright blue liquid, which when seen by artificial transmitted light appears red.

If the indigo has not been perfectly freed from the green, and the brown coloring matters, the extract will have a greenish or olive shade, and any goods dyed with it will be deficient in bloom. If any portion of the indigo has escaped being perfectly dissolved the extract will exhibit floating flakes and specks when mixed with water, and goods dyed with it will probably be spotted.

To remove the green and brown coloring matters, the sulphindigotic acid, Saxony blue, etc., is prepared as follows: One pound of very finely pulverized indigo of best quality (or better still, refined indigo) sifted and carefully dried at a temperature of 150 to 160 degrees F., is put into an earthenware vessel placed in cold water to prevent any rise of temperature. To this is added, carefully and gradually, six pounds of sulphuric acid of specific gravity 1.845, the mixture being kept well stirred during the whole time. The mass is then put in a closed vessel and removed to a stove, where it is kept at a moderate temperature for several days, after which it is dissolved in five gallons of water, and a saturated solution of common salt added until the whole of the blue coloring matter is precipitated. The supernatant liquor, which has a dark green color, is drawn off, and the precipitate is then thrown on a woolen filter and washed with water until the liquid which passes through has a slightly blue tint. By this means an ordinary quality of carmine is prepared, but if a first-class quality is required, perfectly free from green coloring matter, it is necessary to operate as follows:

The carmine prepared in the manner described is dissolved in a mixture of five gallons of water and one pound of sulphuric acid; the sulphuric acid is then carefully neutralized with carbonate of soda, and the whole of the carmine precipitated by a solution of salt. The precipitate, after being thrown on a filter and drained, is again dissolved and re-precipitated, these operations being repeated until the green matter is entirely removed, which may be known by the supernatant liquor no longer having a green tint. It is then washed with water until the liquid comes through blue; when it is drained as far as possible, and finally submitted to slight pressure in linen bags; it is now ready for the market. To ascertain if the green coloring matter is removed, a small quantity of the carmine is rubbed on a piece of glazed paper. When the color dries, it gives a shade varying from a pale blue to a rich coppery purple, according to the mode of manufacture that has been employed; and if any green coloring matter be left it will show itself as a green ring around the blue circle. One pound of indigo yields ten pounds of good carmine.

The solution of the extract in water is bleached by the prolonged exposure to air and light. By nitric acid it is turned yellow, and by an excess of ammonia it is first turned greenish and then destroyed.

An extract of indigo made with an excess of acid, none of which is afterwards neutralized or removed, is called in the dyehouse, "chemic," "chemic blue" or "sour extract" in contradistinction to the paste or "sweet extract" just described. It is, of course, a liquid, and is intensely sour. It is usually made from refined indigo, otherwise it cannot be freed from the green and brown coloring matters.

Extract of indigo in which the acid is perfectly neutralized is called "indigo carmine," "soluble indigo," or "free extract." This may be in either paste or powder form and may be at once distinguished from ordinary indigo, whether crude or refined, by its solubility in pure water. The more acid varieties of extract are used for dyeing woolens and worsteds, while the "sweet" or neutral kinds serve for cotton and silk.

Blues dyed with extract of indigo can generally be stripped or discharged by means of carbonate of soda or ammonia. They are faster where more acid is employed in making the extract. By a particular process, however, they may be made very fast upon wool, and are then known as "navy blues." These are distinguished from vat blues by the circumstance that they do not soil a white silk handkerchief, and that they are more readily discharged by nitric acid. Extract of indigo may be rendered colorless in the same manner as indigo itself, by reducing agents. Thus, if fragments of zinc are placed in a solution of the extract, the blue color is soon destroyed. On prolonged exposure to the air, however, it returns.

Purpuric acid, known as "red extract of indigo," "phenicin" and sulphopurpuric acid. The ordinary extract of indigo is formed as before stated by the prolonged action of the strongest sulphuric acid upon indigo. Now if the quantity of acid is considerably reduced and its time of action shortened, a different product—purpuric acid—is obtained. It may also be made by fusing finely ground indigo with the bisulphate of soda.

Purpuric acid dyes richer and bloomier shades than can be produced by the ordinary extract of indigo. Contrary, however, to what might have been theoretically anticipated, the color is not more stable, being completely stripped by hot soap lyes. By digestion in sulphuric acid, it is readily converted into the common extract. There is also a totally different preparation of "red extract" so-called which is obtained by the action of concentrated solutions of caustic soda or potash upon indigo carmine. The color produced dyes wool in lilacs, flesh colors, vinous reds, and a kind of purple. All these shades are exceedingly fast, resisting all reagents which do not destroy the fiber. They are, unfortunately, dull, however, and thin and expensive as a part of the indigo is destroyed in the process.

Indigo occurs on the market in lumps, which, if good, are of a deep purple-blue color, and exhibit a fine reddish coppery luster if rubbed with a hard polished body. If very hard or heavy the indigo is bad, as also when the color is dull, blackish, greenish, brownish or slate color. If broken, the fracture should be fine grained, uniform and compact. It should not exhibit shining particles when held up to the light, nor should there by any appearance of layers or strata of different shades. Black spots are also objectionable. White or pale greyish spots do not necessarily indicate a bad quality.

The best qualities of Bengal indigo never contain more than 72 per cent of pure indigotin and are characterized by their comparatively low specific gravity, which is but little more than 1.3.

The next qualities are violet red indigos of purple hue, and they are heavier and harder. The red shade is caused by the presence of a large quantity of brown and red extractive matter. It is among these qualities that the indigos giving the finest colors are found, for it would appear that both the red and brown of the indigo take a certain part in the dyeing process; probably they dissolve and are fixed on the cloth along with the indigo, strengthening the shades, and most dyers prefer these red indigos to the first qualities.

The worst qualities both of Bengal and other indigos are those which are of a light blue color, approaching to grey or green. This color denotes the presence of a large quantity of extractive matter of a different kind to the indigo brown which characterizes the red varieties. These indigos are hard and heavy, and do not give a coppery reflection, and when touched with the tongue produce very strongly the sensation of dryness.

There have been several methods devised by chemists to determine the relative commercial value of this valuable dye, but before describing them it may be as well to give the following analysis made by Chevreul, which shows the composition of a fair quality of commercial indigo dried at 212 degrees F.:

Indigotin	45 per cent
Matters soluble in alcohol	30 per cent
Matters soluble in ether	12 per cent
Resin soluble in hydrochloric acid	6 per cent
Mineral matters	7 per cent
	100 per cent

The quantity of hygroscopic water should not exceed six per cent. Berzelius found that the portion soluble in ether and alcohol consisted chiefly of four substances: indirubin, indigo brown, gluten and chlorophyll.

Both organic and inorganic substances are used for the adulteration of indigo. The mineral matters usually added are artificially dyed clay and sand. Starch, Prussian blue, etc., are also employed.

To detect these adulterations 100 grains of indigo, after being dried at 212 degrees F., to ascertain the amount of moisture, is placed in a small earthenware dish and gradually heated to redness. The carbonaceous mass thus formed is taken out, powdered, and again heated until the carbon is burnt off. The weight of the ash remaining is then ascertained, and should not exceed ten per cent. In a pure indigo, the ash is composed of phosphate and carbonate of lime, potassium sulphate, chloride of potassium, silica and a small quantity of oxide of iron. To ascertain if starch is present, 100 grains of indigo are pulverized and boiled with very dilute hydrochloric acid; the clear solution yields a beautiful purple color on adding a few drops of tincture of iodine. A far more important matter to the consumer, however, is to ascertain the exact amount of coloring matter (indigotin) which a commercial indigo contains.

There are several volumetric methods of determining the amount of real indigo blue in a sample, of which the most reliable is here given: 10 grains of the sample to be tested is reduced to a very fine powder and introduced into a stoppered 3 or 4-ounce flask, and well mixed therein with about its equal bulk of very coarsely pounded quartz or rock crystal, clean and perfectly dry; 100 grain measures of fuming sulphuric acid are added, and the flask is stoppered and the whole mixed together by careful shaking. The flask is then exposed to the heat of 80 degrees F. for eight or ten hours, being occasionally shaken. The liquid is then poured into a large graduated jar, every trace of color is rinsed out of the flask, the rinsings are added to the liquid in the jar with sufficient water to make the whole up into 10,000 grain measures. This is well mixed, so that all portions may be exactly alike. One-tenth of the liquid is now accurately taken out by means of a pipette, and placed in a suitable white porcelain dish, or beaker glass, this liquid is next diluted with three or four times its bulk of water, and a standard solution of permanganate of potash is carefully dropped in with the pourette until all the blue and even green color disappears, and a dingy yellow remains. The number of degrees required, multiplied by 10, will give the relative strength of each sample. A similar experiment performed upon pure indigo blue will convert the merely relative values into a positive determination.

Dyeing With Indigo.

By the action of certain bodies termed "reducing agents," which are compounds capable of giving up nascent hydrogen or assimilating oxygen, indigotin is converted into a colorless compound known as indigo white or reduced indigo. This body is soluble in dilute alkaline liquids, such as lime, potash or soda. It is in this form that indigo is used for dyeing. The material to be dyed is immersed in a vat containing reduced indigo; this on exposure to the air is oxidized into indigotin, which is thus fixed in an insoluble form on the fiber. There are numerous substances which have the power in alkaline solution of reducing indigo blue to indigo white: sodium amalgam, zinc, tin, aluminum, magnesium, etc.; ferrous hydrate, hydrosulphurous and hypophosphorous acids, sulphide of arsenic, etc., glucose, gallic acid, etc., and certain organic ferments.

An alkaline solution of reduced indigo has a brownish yellow color; an excess of reducing agent gives a clear, bright yellow solution. The following are the most important indigo vats for cotton: the hydrosulphite, the copperas and the zinc vat.

Sodium hydrosulphite was first recommended by Schutzenberger and Lalande for reducing indigo in the dyeing of cotton, but is now very largely used in the dyeing of both wool and cotton. Hydrosulphite vats may be prepared with either lime or soda. In either case a stock of standard vat should be prepared apart from the actual dyeing vat. In

England the hydrosulphite lime vat is used to a greater extent than the corresponding soda vat, and more particularly for the dyeing of wool, though it is also largely used for cotton yarn, etc. In the dyeing of cotton, more lime and less hydrosulphite are required than for wool. The strong solution of reduced indigo may be conveniently prepared in a cask holding about 50 gallons in the following manner:

20 pounds of 60 per cent indigo, thoroughly well ground to a smooth paste, are put into the barrel with about 20 gallons of boiling water and mixed with milk of lime containing about 24 pounds of quick lime. In the meantime, seven gallons of bisulphite of soda (52 degrees Tw.) have been slowly mixed with seven pounds of good zinc dust. In about a quarter of an hour this latter mixture will have become of a light greyish color and will have lost its smell of sulphurous acid. It is then added to the mixture of indigo and lime, and the barrel filled with hot water so as to bring the whole to a temperature of 80 degrees C. The mixture is to be well stirred and the barrel covered so as to exclude the air. It is allowed to stand, with occasional stirring, for about two hours, when the mixture will have acquired a deep yellow color and is ready for use. In dyeing the vat is filled with water and a small quantity of hydrosulphite solution or mixture of bisulphite and zinc added (with a little milk of lime) to remove free oxygen. After half an hour or so the necessary amount of reduced indigo solution, according to shade required, is added, the vat well stirred and allowed to stand for about one hour for the insoluble matters to settle. The dyeing may then be commenced.

The hydrosulphite-soda vat possesses several advantages over the corresponding lime vat. In the first place, the vat contains little or no sediment and the goods do not require acidifying after dyeing. There is considerable less indigo wasted. This vat is particularly adapted for dyeing piece goods. A standard indigo solution of a similar strength to that described may be made as follows: 20 pounds of 60 per cent indigo, thoroughly ground to a smooth paste, are put into a barrel with about 15 gallons of boiling water, and mixed with seven gallons of caustic soda solution of 42 degrees Tw. To this mixture, 18 gallons of hydrosulphite mixture are added with sufficient hot water to bring the whole up to 50 gallons. The temperature is maintained at about 70 degrees Centigrade for one or two hours. The condition of the vat may be ascertained by dipping into it a strip of sheet glass. When completely reduced the liquor running from the strip of sheet glass will be yellow and take about half a minute to turn green.

The hydrosulphite solution used in preparing this vat is made in the following manner: 10 gallons of bisulphite of soda (52 degrees Tw.) are mixed with 15 gallons of cold water, and eight pounds of zinc powder (made into a paste with a gallon of water) are slowly added with cautious stirring. After about an hour two gallons of milk of lime (containing 10 pounds of quick lime) are added to the mixture, and the whole stirred for some time and then allowed to stand for two to four hours. It is finally filtered, preferably by means of a filter press. The hydrosulphite solution should be used as soon as possible and should never be exposed to the air.

Hydrosulphite powder possesses a great advantage over the bisulphite and zinc preparations in being much more concentrated and at the same time more stable. In working with liquid hydrosulphite there is always considerable loss and this is avoided by the use of the concentrated powder. It may be used in the following proportions: 3⅓ pounds of indigo are ground and mixed with two gallons of water; 2½ pounds of hydrosulphite powder are slowly added during constant stirring for about ten minutes, then five pints of caustic soda 76 degrees Tw. are added. The mixture is now heated for one or two hours until the indigo is reduced. In preparing a dye vat about one ounce of hydrosulphite powder should be added per 100 gallons of water to remove free oxygen.

The copperas vat always contains a lot of sediment, and it is, therefore, chiefly used in the dyeing of yarn in the hank. In favor of this type of vat are the facts that it is both easily set and kept in condition. A certain amount of indigo is always lost in the copperas vat, due to over-reduction. The excess of lime present in the vat dissolves the indigo white. Temperature in the dyehouse should not be too low in wintertime. The indigo should be well ground with water. The lime is made into a thin uniform paste with water, a little warm water is added, and the indigo stirred into it. The copperas is dissolved in water, and the solution added slowly and with continuous stirring to the indigo and lime mixture. The whole is poured into a barrel, and filled up with warm water and covered with a lid and allowed to stand until it is cool. During the cooling, which should take from five to six hours, the liquor is occasionally stirred. It will be ready for use as soon as it assumes a clear yellow shade.

The dyevats have in the meantime been partly filled with water, to which the stock vat is now added. After the liquor has been well stirred for some time, it is allowed to settle. After four or five bundles of yarn have been dyed, the vat is stirred up and again allowed to settle. In this manner, from three to four lots may be dyed per day until the vat is exhausted. If the vats are used in series of say five vats of different strengths, they may be freshened up from time to time with lime and copperas, until exhausted. The boiled yarn should be hydro-extracted or well wrung, and then thoroughly shaken out before entering the vat. The yarn is soured after dyeing in a one to two per cent solution of sulphuric acid and is finally well rinsed. Before pouring the stock vat into the dye vat, one pound of copperas and 1½ to 2 pounds of quicklime should be added to the dye vat per 100 gallons of liquor—this to reduce the oxygen in the water.

There are various proportions of dyestuffs and chemicals used in making up the copperas vat according to the style of goods to be used and the ideas of the dyer, we will give two: Water, 400 gallons; indigo (60 per cent), 20 pounds; quicklime, 80 pounds; ferrous sulphate, 80 pounds. Another: water, 400 gallons; indigo, 20 pounds; quicklime, 25 to 50 pounds; ferrous sulphate, 30 to 40 pounds—a wide choice.

In the zinc vat the hydrogen required to reduce the indigo blue to indigo white is produced according to the following equation:

$$Zn + Ca(OH)_2 = ZnO_2Ca + 2H.$$

The indigo white dissolves in the excess of lime present in the vat. As compared with the copperas vat, the zinc lime vat contains much less sediment, and it may, there-

fore, be used in all the different kinds of vats.

The indigo should first be ground while dry and afterwards in water. The reduction should be conducted at 105 to 120 degrees F. and it should be completed in four to six hours. Fresh solutions should be made as often as required because the liquor is unstable and will not keep long. The vat used in dyeing ought to contain from two to three parts by weight of indigo per 1,000 parts of water. For each 100 gallons of water use two pounds of indigo (60 per cent), one pound of zinc dust, and one pound of quick lime. Or four pounds of indigo, two pounds of zinc dust, and four to five pounds of quicklime.

To the finely ground indigo add the zinc dust and about two gallons of water at 110 to 115 degrees F. The quicklime is made into a uniform paste with water, and when cooled to about 115 degrees F. is added to the indigo paste, and the whole poured into a barrel and water added to make ten gallons altogether, and stirred from time to time during four to five hours. A vat containing 100 gallons (as above) has to be sharpened occasionally with ½ to one pound of lime and ¼ to ½ pound of zinc dust, mixed in water, and added from time to time. There being much less sediment than in the copperas vat, the vats need not be so deep.

After dyeing, the goods require souring as in the copperas vat. The cold vats are chiefly used in cotton dyeing. A certain amount of indigo is invariably lost in the vat due to the formation of products, other than indigo white, and the greatest care has, therefore, to be exercised to conduct the vats so as to reduce this loss to the minimum. The loss of indigo in the different vats has been estimated as follows: Copperas vat, 25 per cent, calculated on the amount of indigo fixed on the fiber. Zinc lime vat, 10 per cent. Pure hydrosulphite vat, two per cent. Bisulphite—zinc dust—caustic soda vat 20 to 30 per cent, especially if the stock is left standing for some time.

The following simple method of recovering the waste indigo from copperas, zinc, bisulphite or other sludgy vats will pay for itself. The clear liquor which remains in the spent vat must be siphoned off, and then the green pulpy mass remaining must be pumped up into a tank leaving at the bottom of the vat the bulk of the lime and other impurities. Hydrochloric acid (very dilute) is then added to the green pulp in the tank to dissolve any carbonate of lime that may be present and then about ten per cent more hydrochloric acid is added to decompose the indigotate of lime and the whole left to settle for 12 hours. The clear liquor is then siphoned off and a quantity of hydrochloric acid added to the residue until it is strongly acid. By this means the iron compound is decomposed, chloride of iron being formed and white indigo being liberated which rapidly becomes converted into indigotin and may be recovered and used again.

[This is the second of a series of articles on Indigo by Mr. Nanson. Another will appear in an early issue. —Editor.]

Color cards are being distributed by E. I. du Pont de Nemours & Company on the following four colors: Pontamine Orange 4G, Pontamine Yellow GR, Pontamine Fast Scarlet 4 BS, and Sulfogene Dark Brown GN Extra. The three first named are direct colors, while the latter is a sulphur color of a dark greenish shade.

Southern Textile Association.

The program for the annual meeting of the Southern Textile Association, which is to be held at the Oceanic Hotel, Wrightsville Beach, N. C., on Friday and Saturday, June 2nd and 3rd, contains a number of features which should make this convention one of the best in the history of the organization. The practical discussion feature will be given a considerable portion of the time, and the social side of the affair has not been neglected. On Friday afternoon, the session will adjourn at 3:30 o'clock, and those so desiring will enjoy surf bathing at the beach. Those delegates who do not choose to participate in this method of recreation will seek diversion at some of the other forms of entertainment offered by this popular resort.

The complete program follows:

FRIDAY MORNING, JUNE 2—10 O'CLOCK.

Address of Welcome, by Roger Moore, of Wilmington.
Response, by L. R. Gilbert, Raleigh, N. C.
Annual Address of President, by G. A. Johnstone.
Address, by B. M. Nussbaum, New York City.
Discussion—"Cloth Tolerance"—led by H. H. Boyd, Charlotte, N. C.

FRIDAY AFTERNOON, JUNE 2—2 O'CLOCK.

Report of F. Gordon Cobb, General Chairman of Sectional Committee Work.
Discussion—"Opening, Mixing and Picking"—led by B. R. Burnham, Whitney, S. C.
Adjourn at 3:30 for surf bathing.

FRIDAY EVENING.

Dancing at Lumina Pavillion.

SATURDAY MORNING, JUNE 3—10 O'CLOCK.

Address by J. D. Hammett, Anderson, S. C.
Report of Chairman of Carders' Division.
Report of Chairman of Spinners' Division.
Report of Chairman of Weavers' Division.
Report ofChairman of Cloth Room Division.
Report of Secretary and Treasurer.
Election of Officers.
Business Meeting.
Adjournment.

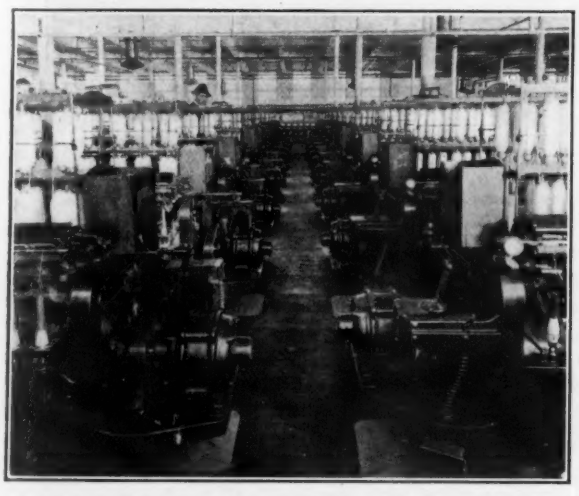
The Charles Bond Company, of Philadelphia, well known as specialists in the manufacture of textile leathers, have recently added a line of imported sheep skins for covering cotton spinning rolls. The tanners of these skins have been specialists in the tanning and finishing of sheep and calf skins for textile purposes for generations.

These sheep skins are finding a ready sale, it is claimed, particularly in the southern states. The skins offered by this company differ from the domestic skins in that they are trimmed to size and do not contain any bellies, heads, shanks or other offal, it is said. That part of the skins furnished is only the prime portion of the pelts, the representatives state, and can be used in its entirety for making into cots, without waste. As a result of the close trim and the elimination of unsuitable waste portions, these skins show economy in cutting tests as compared to full skins formerly used; it is further pointed out that on account of the special manner in which the leathers are tanned and finished that they wear longer, make less waste, increase production by making fewer broken ends, and improve the appearance of the yarn.

What the Southern Mills are doing

Hawthorn Spinning Mills, Clover, S. C.

Outstanding among "What the Southern Mills Are Doing" is the announcement made during the past month by the Ware Shoals Manufacturing Company, at Ware Shoals, S. C., that they propose to build one hundred or more new houses in their village; that the plants of the company will be operated on a 24-hour day basis; that the capacity of the bag factory will be enlarged or an additional factory built; that they are contemplating the erection of a large apartment house for workers; and that a bleachery will be constructed at Ware Shoals.



H. & B. Frames at the Hawthorn Spinning Mills Equipped With Individual G. E. Motors and Morse Chain Drives.

The new dwellings will be erected to house the additional workers that will be required to operate the manufacturing plants during the night shift. They will be built along the latest models of cottage and bungalow style, each house to be equipped with electric lights, running water and other modern conveniences. Some of the houses will contain four rooms, some five and some six rooms.

The apartment or rooming house which is contemplated will be used for girls and women exclusively. It will have at least 25 rooms, it is stated, each equipped with electric lights and hot and cold water.

The construction of the bleachery and the added bag manufacturing facilities will allow the organization to turn out the finished product complete in Ware Shoals, and this new construction is planned to eliminate the necessity of shipping the goods to the North for these operations.

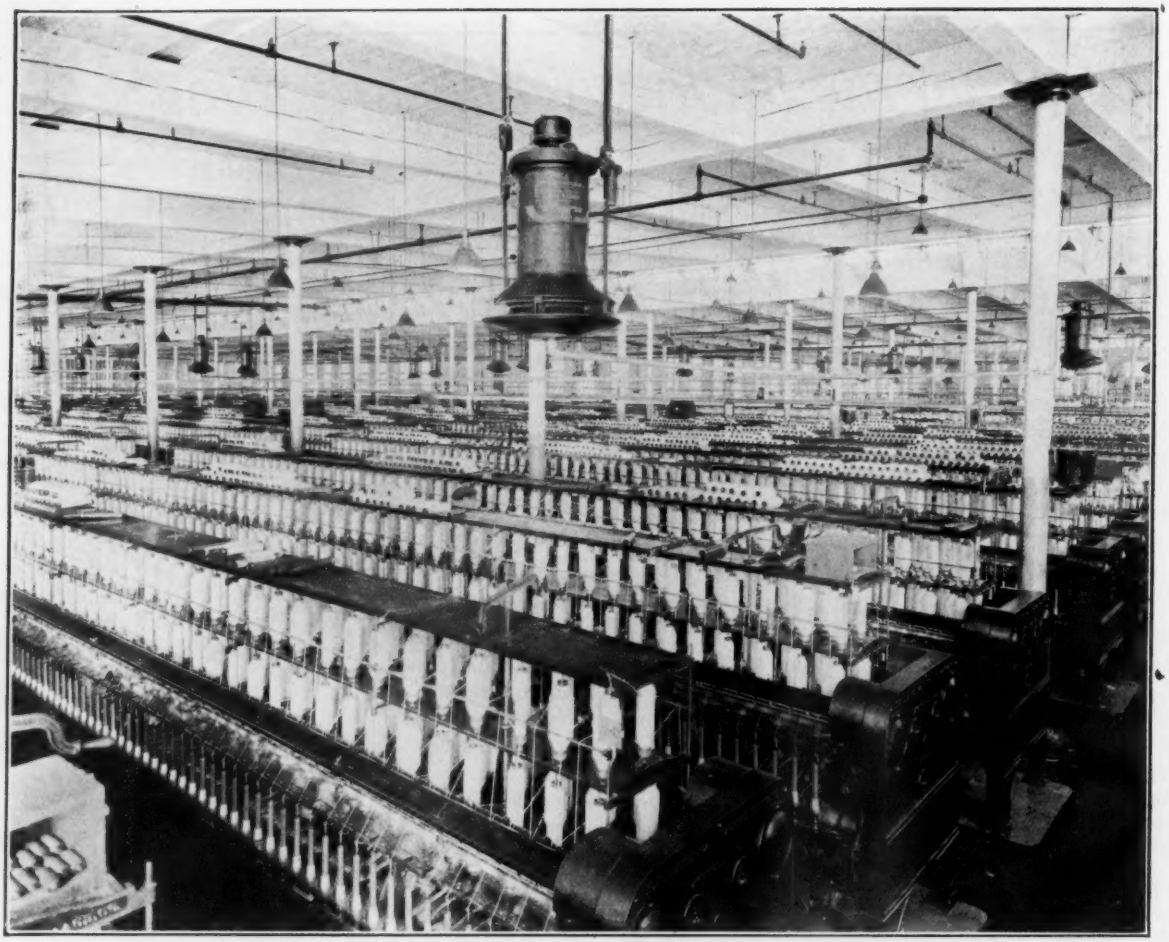
In addition to this encouraging news from Ware Shoals comes word from other sections of the southern territory which indicate a much improved condition, particularly on certain classes of product. During the month a number of plants are reported as resuming operations after a shutdown, among these being the plants of the Hamilton Carhartt Mills at Rock Hill, S. C., which manufacture denims. The yarn mills in the North Carolina section continued their policy of curtailment in production, although it was stated that in other parts of the section sufficient orders were being received to warrant the running of the mills full-time. Notable among these was the Lavonia Cotton Mills, at Lavonia, Ga., which was reported to be behind with yarn orders.

The yarn manufacturing plant of the Danville Knitting Mills, at Bon Air, Ala., are changing their mill over to electric drive, and individual motor and chain drives will be used on the majority of the machines. Robert & Company, architects and engineers, Atlanta, Ga., are handling this electrification work.

The new Watts Spinning Company mill at Stony Point, N. C., will be equipped with 6,000 spindles. Machinery will be electrically driven, current being generated by the mill's own steam plant. Production will be on 30s to 60s combed yarns. The officers of the company are A. L. Watts, president and treasurer; Dewey Watts, secretary; and A. F. Ball, superintendent.

It is reported that the Augusta (Ga.) Factory intend to electrify a part of their equipment at once and the remainder later.

The new bleachery which is to be erected at Griffin, Ga., will be known as the Lowell Bleachery South, it is stated, and contract has been let by the Lowell Bleachery of Lowell, Mass., for its construction. The plant will consist of three connected units as follows: Finishing building, 207 by 106 feet, two stories; bleach house, 251 by 116 feet, one story; engine house, 74 by 53 feet, two stories, equipped with two boilers. All buildings of standard mill construction.



A GENERAL VIEW OF THE INTERIOR OF THE HAWTHORN SPINNING MILL.

This plant will handle the output of the Kincaid Manufacturing Company of Griffin, although it is stated that the recent increase in capitalization of that concern in no way affected the new bleachery project. This construction work also includes a warehouse, 100 feet square, and a reinforced concrete reservoir to hold one million gallons of water.

The annual commencement exercises for the night school classes of the Carolina Cotton & Woolen Mills Co., at Spray, N. C., were held in one of the Y. M. C. A. buildings on Saturday, April 1st. This marked the closing of one of the most successful years of night school work ever conducted in that community. A total of 32 night school classes, studying vocational subjects and mill arithmetic, were organized and taught from October, 1921, to April, 1922. There were about 300 men and boys enrolled in these classes; four classes for adult illiterates were also taught, with an enrollment of 44 men and boys. The classes averaged about 15 nights of teaching, with an average attendance of 65 per cent of the enrollment. The average enrollment was ten pupils per class.

At the commencement exercises, L. W. Clark, general manager of the company, made a forceful and encouraging talk to the students and teachers. Other short and interesting talks were made, following which a refreshment course was served and two reels of educational pictures were shown.

Announcement has been made that, under a recent plan of reorganization of the Blue Buckle Cotton Mills., Inc., at Rock Hill, S. C., the Industrial Cotton Mills Co., Inc., has acquired all of the common stock and a major portion of the preferred stock of the former company, as well as more than 99 per cent of the unsecured notes and claims against the Blue Buckle Cotton Mills, Inc. This information is contained in a notice sent to stockholders by Alex Long, the president of the Industrial Cotton Mills Co., Inc., which is the reorganized company owning the Blue Buckle mills at Rock Hill, which were placed in the hands of a creditors' committee and later reorganized after the failure of the Jobbers' Overall Co., of Lynchburg, Va., of which these mills were a subsidiary.

Tentative plans have been made to build a dye-house and shirt factory in connection with the cotton mill that is to be built at the Alabama State Penitentiary under the supervision of the State Board of Control. J. E. Sirrine & Company, Greenville, S. C., are the engineers for the cotton mill.

The Massachusetts Cotton Mills, Lindale, Ga., have recently completed the installation of a new steam turbine power plant.

It is reported that the Aurora Cotton Mills, Burlington, N. C., are planning an addition to their dyehouse.

The Lily Mill & Power Company, Shelby, N. C., will erect an 80 x 92 foot one-story and basement extension to their mill.

The J. Spencer Turner Company of New York, the First National Bank of Birmingham, and the First National Bank of Athens, the holders of $250,000 of the bonds of the Fulton Cotton Mills at Athens, Ala., have bid in the property, the sale having been conducted by R. H. Walker, acting for the referee in bankruptcy. Guy A. Williams, superintendent of the plant, has been directed to remain until a decision of the purchasers as to whether to operate the mill or allow it to remain closed down as at present.

The Victor-Monaghan Mills are building ten new cottages for operatives at their plant in Seneca, S. C., including a home for Superintendent W. P. Leister. The company is also preparing to build a new church for its workers.

Citizens of Enfield, S. C., are interested in a movement to construct a cotton yarn mill at that place.

The Anderson Cotton Mills, Anderson, S. C., have issued $200,000 of 8 per cent cumulative preferred stock, the proceeds of which will be used to retire an issue of $100,000 one-year notes due January 1, 1923, in addition to other corporate purposes.

The Rocky Mount (N. C.) Mills have put in three new spoolers, one 2,000-end Denn warper and three ball warpers.

The Fulton Bag & Cotton Mills, of Atlanta, Ga., will erect a branch factory and administration office at Minneapolis, Minn.

It is rumored that the Cannon Mills, of Kannapolis and Concord, N. C., are contemplating the construction of a large bleachery at Badin, N. C.

The Ranlo Manufacturing Company, Ranlo, N. C., has let contract for the construction of a one-story addition to its mill, which will be used for weaving purposes. Lockwood, Greene & Company, Charlotte office, are the engineers.

The Catawba Spinning Company, Mount Holly, N. C., is erecting machinery in its new addition.

It is reported that the Carolina Power Company will spend approximately $4,000,000 in the extension of its power line from Sanford to Badin, N. C.

A warehouse will be constructed by the Republic Cotton Mills, Great Falls, S. C.; standard mill construction, to contain about 10,000 square feet. J. E. Sirrine & Company are the engineers.

The Spindale Mills Company, Spindale, N. C., will build a complete mercerizing plant in connection with the finishing plant recently installed. K. S. Tanner is president.

The North Carolina Finishing Company, Yadkin, N. C., will double its capacity at once.

John D. Taylor, president of the Summerville (Ga.) Cotton Mills, is having a survey made for the erection of a new hydro-electric plant on the Chattooga River, with a capacity of 2,000 horsepower to be used in the cotton mills and other industries.

Plans are being made to construct a hydro-electric plant at Taylor's Mill, Pittsboro, N. C.

E. I. du Pont de Nemours & Co., Inc., have recently distributed a folder showing colors recommended for padding, both for unmercerized and for mercerized goods, and giving suggestions for their use in producing various shades.

The New England Mill Situation.

Mills and their managers in New England are undergoing a new experience in the history of labor troubles. The strikes that have been going on for twelve weeks in various centers are apparently receiving the backing of public sentiment to a degree hitherto unknown. Labor leaders have entered on a campaign of elucidating the intricacies of mill statements, going back in some instances for several years, to show that the capital has been an abnormal accretion of earnings, stock dividends, and so on. The daily newspapers give full space to anything said by the labor leaders and rise to the defense of the mills only when some mill manager makes a statement.

Even then, mill managers have found it wise to advertise the facts of the situation as they see them. Critical editorials appear after advertisements have been published and the tone of most of them is adverse to mill interests.

This lack of defense of mill properties and mill management has oftentimes been experienced before in a small degree but today the prevailing sentiment seems to be one of attacking the industries on which the prosperity of many communities depend. As the mill managers are for the most part the hired men of stockholders who make up the general public they can do little else than sit by and await a change of sentiment. The lesson of the economic conditions of the time is going to be learned through pain and idleness.

It is remembered that when strike leaders from New York centered their efforts in North Carolina last year, nearly every newspaper in the South did something toward pointing out the truth of the conditions that forced a revision of wages. That used to be the condition in New England. Today, the mills of New England are not only grossly overtaxed in municipalities but they are apparently regarded as the foe of human kind.

From the time the troubles began a great many clergymen took sides openly against the mills. In one quarter a bishop was outspoken against the mill management. While there has been a distinct change of opinion in this particular instance since the facts of the real situation were laid before this gentleman, it is still true that mills lack popular support. It is not expected that business men whose trade falls off when strikes are long continued will rise to the defense of mills yet in this case it would seem as if enlightened interest would have prompted business men of vision to make it clear to their customers that they are not to be relied upon to fight economic laws that can be met only in one way.

The amount of idleness in cotton mills and worsted dress goods mills is still not fully appreciated in the markets nor by the general public of New England. It has been estimated that the mills are operating to less than 60 per cent capacity. It is certain that because of the idleness of the mills involved in the strikes that started more than twelve weeks ago, more than 100,000,000 yards of staple, standard goods have not been produced. The goods include staple and dress ginghams, bleached muslin, napped goods of all kinds, cotton blankets, printed goods, and worsted dress fabrics. Not less than 20,000 gingham looms are idle. The largest print works and two of the largest bleacheries are shut down tight.

More viciousness has been displayed by some of the idle

workers than has been seen in New England since the strikes in Lawrence ten years ago. The carryings-on in Rhode Island, where some low Italian elements are practicing their nefarious methods of striking, have placed that tight little center of industry before the nation as a center of labor unrest and industrial barbarism. Storming the legislature to force the enactment of a 48-hour law is a form of duress that conservative elements finally fought off through holding a bill in committee until the life of the legislative session expired. In New Hampshire a governor stoutly resisted calling a special session of the legislature to enact a 48-hour law to break the strike started some weeks before.

Massachusetts stands alone in insisting on a 48-hour law and the effect of this restriction is seen in the loss of $10,000,000 in the reserves of Fall River mills in 1921.

Daily newspapers have made much of the great earnings of the mills in the war years. They have not pointed out simultaneously the extraordinary earnings of mill operatives in the same period. Nor have they shown that of the great earnings of the mills, immense sums went to pay war bills and other bills in the form of a crippling taxation. But what is of larger consequence in arriving at a just estimation of the worth of cotton mills as an investment, they have not shown that any mill in the whole district has done better than turn out an average of more than 6 per cent over a period of 50 years. The fact is that the best managed mill of all has not done more than pay bank interest to its original investors.

It is felt at this time that the troubles may go on until June. The six months wage period adopted in Fall River, not as an arbitrary thing, but as a result of custom established in recent years, will expire June 1st. At the present time neither New Bedford nor Fall River mills are operating more than 70 per cent capacity although supposed to be "running." Throughout Connecticut some of the best equipped mills in America have gone on a three- and four-day week schedule. Although the mills in Maine have been operating on a 54-hour week and their operatives accepted a 20 per cent reduction, they have not run in full this year.

The true reason for this is found in the low purchasing power of the people using cotton goods and the lack of profit margin in the business. Southern mills with all their great advantages have not found business satisfactory for weeks past and some of them would not make a profit today if they were buying cotton and selling cloth on the current market. It is one of the difficult times that comes up in every readjustment of business after a great financial contraction.

There is naturally a feeling of depression among conservative mill managers because of the unhappy conditions of things in the section. At the same time, they have no thought of abandoning their determination to fight out the present troubles to a finish if operatives care for that sort of an ending. At this time it is possible to see an ending of the union domination that came into New England with a fierce snarl in Lawrence, Mass., ten years ago when the first of the I. W. W. troubles began. It seems pretty well assured that the present leaders of the strikes will be thoroughly discredited when the troubles are over. They are fighting each other just now in the newspapers but before a great while they will find themselves fighting operatives who are tired of idleness and charity.

It is inevitable that unless there comes a secondary financial inflation in this country, something that is now being talked of a great deal among manufacturers, there will be many small business failures in New England that will trace beginnings to the depression begotten by the strikes and the current idleness. The mills will not be seriously hampered financially as many of them are saving more through curtailment than would be possible under operating conditions. Should the strike end at once it will be months before normal production can be restored. This is due to the fact that New England operatives can live well in the summer at the shore or on the farms, and prefer to idle their time away to resuming work at once. This has been the common experience after such long struggles and it is expected to be the experience in this instance.

The certainty that production is to be greatly curtailed for some time to come is the one bright spot in the outlook. The effect on the markets has not been felt yet, but before jobbers begin to buy for Fall as they will surely have to do in the next six to eight weeks it will be found that many needed goods are not to be had promptly. A third of the Fall orders on ginghams has already been cut off by the large mills and by May 1st another third will be wiped off the books.

It is a matter of frequent comment that if this great strike had not happened a catastrophe would have occurred in cotton goods prices despite the stability of raw cotton. Prices have fallen so much that the best print cloth mills of the South as well as many of the sheeting mills were confronted with the proposition of accepting business at cost or a slight loss to keep the mills busy and the help employed. Merchants are agreed that if the full volume of production had come on the markets this spring a savage price decline would have been seen. To that extent the curtailment has been helpful.

There has been a change in sentiment concerning the real worth of cotton in the world's markets under present conditions. For five or six years before the war cotton ranged in value from 11 cents to 13 cents a pound, so that the current price of 18 cents is not relatively high measured by the factors of added cost of production that are not going to be changed so long as high taxes and other "highs" continue. Moreover, the statistical conditions are such that speculation can start at any minute in the months still left for the marketing of the current crop, whatever may happen to the crop just being planted.

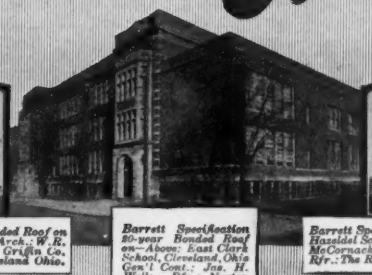
A credit condition exists that is bound to have an effect upon business for some time. Many traders could double their sales if they felt that bills incurred would be paid. There is also the certainty now that the new tariff bill is to be a bone of contention all Summer. Manufacturers of experience are not satisfied with it although it was adopted at the behest of their committees. The wool manufacturers are especially irritated by the new bill and the silk men are not overly well pleased. There is a feeling growing in New England that in the present state of the world's business it is not good judgment to erect a still higher tariff wall in this country, yet should bonus legislation be passed with its possibility of further inflation and national borrowing, a feverish activity is quite within the probability of the year, as many manufacturers see it at this time.

A pessimist growls at the sunshine because it casts shadows.

Barrett Specification Roofs

Bonded for 20 and 10 Years

Barrett Specification 20-year Bonded Roof on Corlett School, Cleveland, Ohio. Arch.: W. R. McCornack. Gen'l Cont.: C. N. Griffin Co. Rfr.: The Rudolph & Son Co., Cleveland Ohio.



Barrett Specification 20-year Bonded Roof on—Above: East Clark School, Cleveland, Ohio Gen'l Cont.: Jas. H. Wells. Rfr.: Norton Bros., Cleveland, Ohio.

Left: Addison School, Cleveland, Ohio. Arch.: W. R. McCornack. Gen'l Cont.: C. N. Griffin Co. Rfr.: The Rudolph & Son Co., Cleveland, Ohio.

Right: Miles Standish School, Cleveland, Ohio Arch.: W. R. McCornack. Gen'l Cont.: The Drummond-Miller Co. Rfr.: The Dalzell Bros. Co., Youngstown, Ohio.

Barrett Specification 20-year Bonded Roof on Hazeldel School, Cleveland, Ohio. Arch.: W. R. McCornack. Gen'l Cont.: Keough Const. Co. Rfr.: The Rudolph & Son Co., Cleveland, Ohio.

Cleveland's New School Buildings

TO house its army of 122,000 public school pupils, the City of Cleveland has provided many splendid new buildings. Architecturally, they are masterpieces—models of convenience, comfort, safety. And in line with standard practice the country over, most of these schools are covered with Barrett Specification Bonded Roofs.

One reason for the popularity of these roofs is, of course, their unequalled economy—moderate cost, long service, and no upkeep. But another reason, and a very important one, is their high fire-resisting qualities.

When burning brands fall on the slag or gravel surface of a Barrett Specification Roof, they burn themselves out without doing serious damage. If a fire inside the building weakens the roof-deck, the Barrett Specification Roof has the necessary tensile strength to support itself over a large area, thus effectively blanketing the fire.

The degree of fire protection afforded by a roof is not determined by the character of any one ingredient of the roofing material, but by the ability of the completed roof to resist fires that attack it, whether from the inside or the outside of the building. Barrett Specification Roofs are given base rating by the National Board of Fire Underwriters.

There are two types of Barrett Specification Bonded Roofs—Type "AA" bonded for 20 years; and Type "A" for 10 years.

Before specifying or closing contract for a Barrett Specification Bonded Roof, be sure to read carefully all the stipulations in the Specification.

Full details regarding these Bonded Roofs and copies of The Barrett Specifications sent free on request

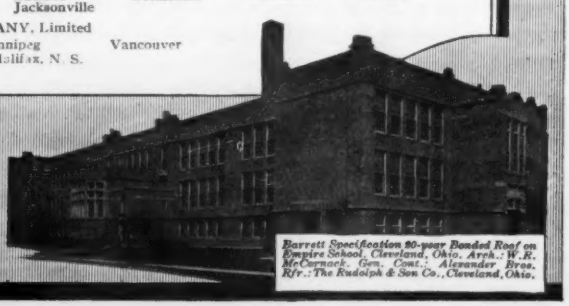
The Barrett Company

New York	Chicago	Philadelphia	Boston	St. Louis	Cleveland	Cincinnati	Pittsburgh
Detroit	New Orleans	Birmingham	Kansas City	Minneapolis	Dallas	Syracuse	Peoria
Atlanta	Duluth	Bangor	Salt Lake City	Washington	Johnstown	Lebanon	Youngstown
Milwaukee	Toledo	Columbus	Richmond	Latrobe	Bethlehem	Elizabeth	Buffalo
Baltimore	Omaha	Houston	Denver	Jacksonville			

THE BARRETT COMPANY, Limited

Montreal Toronto St. John, N. B. Winnipeg Halifax, N. S. Vancouver

Barrett Specification 20-year Bonded Roof on West Technical High School, Cleveland, Ohio. Gen'l Cont.: C. N. Griffin Co., Cleveland, Ohio.



Barrett Specification 20-year Bonded Roof on Empire School, Cleveland, Ohio. Arch.: W. R. McCornack. Gen. Cont.: Alexander Bros. Rfr.: The Rudolph & Son Co., Cleveland, Ohio.

The Knitting Industry of China.

(*Continued on page* 470.)

the home demand will engage much Chinese capital and labor. Chinese knitted silk hosiery has become an important article of export. Chinese embroideries and laces, both cotton and silk, may replace Italian and French products in the American markets. The small hand and deft fingers of the Chinese, combined with the plentiful supply of labor, make the future of the lace and embroidery industries very promising. Already the exports of laces and embroideries reach large aggregate values.

Cotton Comment.

BY H. AND B. BEER.

New Orleans, April 17, 1922.

Compared with one month ago values are somewhat higher for futures, especially for new crop deliveries, but spots remain unchanged.

During the past month more favorable weather was experienced in the eastern half of the belt, and while the drouth in the Southwest was effectually broken by copious rains, particularly in West Texas, the precipitation was excessive in other sections of Texas, delaying farm work. However, the rains in Texas may prove to be a blessing in disguise, there being a good season in the ground, something which was lacked, and probably accounting in a measure for the almost crop failure in that important state last year.

Nearly all sections of the cotton region have had sufficient rain for the present, and dry, warm weather is now urgently needed in nearly all districts to permit farmers to catch up with their work.

Sales of fertilizer in the cotton states show some increase for month of March compared with last year—810,446 tons against 715,993—but the total sales for eight months at the close of March were somewhat less than last season—1,361,382 tons vs. 1,372,321 tons—however, prospects are that returns for April will show larger for the month and for the nine months compared with one year ago. The general impression is that sales of fertilizer in the cotton belt this year will eventually show an increase of 10 to 20 per cent over the sales of last year.

As to the acreage, some increase is indicated also, current advices indicating an increase over last year of about 10 to 15 per cent, the greatest increase expected is west of the Mississippi River, especially in Oklahoma and Texas, and a good increase is anticipated in Alabama.

At best, however, prospects are that the increase in fertilizer and in the acreage will be of only moderate proportions because of the unfavorable financial condition of producers with which to permit the working of a very large crop.

Under the circumstances the outlook for the new crop is uncertain, as it will likely require the best of weather conditions during the remainder of the planting season and during the growing and maturing periods to make a full crop owing to the reported presence of the weevil in greater numbers and over a wider area than ever before.

Meanwhile stocks of old crop cotton in the South are decreasing rapidly owing to exports increasing again and because of American mills consuming more cotton than was thought possible with the New England cotton mill strike still in force. As a result the statistical position of the staple in America is gradually growing stronger.

Contrary to general expectations, mills in the United States consumed 563,000 bales during March vs. 483,000 last year, making the total for eight months 4,390,000 bales, against 3,490,000 last season, of which 387,000 were linters vs. 320,000.

COMPARATIVE STOCKS.

March 31st.	This year	Last year
American mill stocks	1,553,961	1,336,542
Stock in public storage in U. S.	3,765,804	5,252,852
Total stocks in the United States.	5,319,765	6,589,394

That exports are increasing is noted by shipments of 74,000 bales thus far this week vs. only 7,000 last year, making the total thus far this season 4,558,000 against 3,903,000 last season.

An encouraging feature for the making of better business at home and abroad is the easiness of money in this country, with prospects of lower interest rates in the future, probably to come of the action of the Bank of England last week in lowering its discount rate to 4 per cent, the lowest level since 1914, or before the outbreak of the world war. At this time last year the Bank of England discount rate was 7 per cent.

Wall Street and London remain optimistic as to the future, laying much stress on the comparative cheapness of money and prospects of lower taxation, and are hopeful of important favorable developments to come of the Genoa conference, now in session.

The cotton movement from August 1 to April 14, as shown by the Department of Agriculture, was as follows:

	1921-22 Bales	1920-21 Bales
Port receipts	4,870,754	5,007,170
Port stocks	1,003,978	1,417,870
Interior receipts	6,282,277	6,072,655
Interior stocks	1,096,517	1,623,685
Into sight	8,530,459	8,795,225
Northern spinners' takings	1,784,503	1,420,859
Southern spinners' takings	3,027,000	2,097,000
World's visible supply, Amer. cotton	3,511,971	4,431,408

Knitting Calculations.

This is the title of a recently published handbook of practical problems in flat and rib knitting, for the use of the practical knitter in the routine of daily work. The author is Ernest Tompkins, M. E., the writer of a number of works on the science and technology of knitting, who states that the rules given in this book were derived from voluminous notes made during many years and from extensive experimental work with different gauges, yarns and stitches, enabling the knitter to shape his course by basing it upon the experience of others. A great proportion of the problems, instead of being worked out for this book, are problems which were previously solved to meet some actual requirements, thus giving them a practical value in the knitting mill. The book contains 84 pages of text, which includes a complete subject-index, and the publishers are the Bragdon, Lord & Nagle Co., 334 Fourth Avenue, New York City.

H & B AMERICAN MACHINE COMPANY

PAWTUCKET, R. I.

Southern Office Atlanta Trust Co. Bldg. Atlanta, Ga.

Opening and Picking Machinery

Card Room Machinery

Spinning Machinery

Twisters for Wet or Dry Work

With Band or Tape Drive

COTTON MACHINERY

Two new improvements for the spinning frame have recently been developed by the Campbell Manufacturing Company, which has executive offices in the Slater Building, Worcester, Mass. One of these is a new ball bearing lifter rod bushing, which, it is stated, will prevent the lifter rod from sticking in the bushing and which takes the place of the plain bushings now provided on frames. A new feature of this bushing is that it has four balls set in the inner circumference, which project about one-quarter of their diameter, as can be seen in the illustration. The lifter rod

runs through the bushing and impinges against the four balls, thus leaving space around the lifter rod for lint and dirt to fall through and allowing the rod to be free from impediments to its free movement.

The other improvement is known as the Ware shell builder roll. The shell revolves on a lubricated arbor, which is provided with grooves for retaining the lubricant, thus making a roll which, the manufacturers say, will not stick.

Color cards on the following dyes have been distributed by E. I. du Pont de Nemours & Co., Dyestuffs Department, Wilmington, Delaware:

Pontamine Fast Scarlet 8 BS, a direct scarlet of a bright bluish shade, for dyeing cotton goods in all stages of manufacture. Pontamine Fast Orange S, a direct color of reddish orange shade, for use in dyeing all classes of cotton goods.

Pontacyl Sulfon Blue R, an acid color of a bright navy blue shade. Pontacyl Fast Yellow G, a bright acid yellow of greener shade than Pontacyl Fast Yellow Y, distinguished by its fastness to light and leveling properties. Pontacyl Brilliant Blue A, a bright acid blue of clear greenish shade. Pontacyl Blue B, an acid blue of a bright clear shade.

A comprehensive digest of the latest available reports of the large stock fire insurance companies, showing the remarkable growth in volume of business during a period of twenty years, has been issued under the title "The Brewster Fire Insurance Digest," by A. Irving Brewster, 9450 Lefferts Ave., Richmond Hill, N. Y. This volume is compiled especially for property owners and gives information as to the growth of cash assets from 1901 to 1921, the growth of the net surplus during that period, the total net premiums received from policyholders, total net losses and cash and stock dividends paid to stockholders, premium income for one year, interest earnings from all sources for one year, and other information not generally disemminated among the layman property owners. The price of the digest is $1.00 per copy, postpaid.

Most men are suspicious of others because they know themselves.

Notes About Men You Know.

HARRY S. ROBERTS has accepted a position with the Allis-Chalmers Manufacturing Company of Milwaukee, Wis., and will represent this company in the southern textile industry. Mr. Roberts is well known among southern cotton manufacturers, having been associated with the industry in this section for the past fourteen years, the major portion of which time he has been connected with mill power equipment, and thus carries to his new association a familiarity of the field and the particular division in which he will be interested. For the past three years Mr. Roberts has been connected with the organization of Lockwood, Greene & Company, engineers. His headquarters as textile representative of the Allis-Chalmers Company are at the southern office of the organization, Healey Building, Atlanta, Ga.

WALTER M. WELLMAN has been elected secretary and treasurer of The Margaret Mill, Huntsville, Alabama, to succeed his father, the late W. T. Wellman, who died the later part of March. Mr. Wellman has been the assistant of his father since his return from the service during the World War.

C. McD. CARR, vice-president of the Durham Hosiery Mills, Durham, N. C., has been elected president of the company to succeed the late J. S. Carr, Jr. A. H. Carr, formerly vice-president and assistant secretary, has been made vice-president and treasurer.

G. W. JOHNSTON has been promoted from second hand to overseer of weaving at the Fountain Inn Mills, Tarboro, N. C.

CULVER BATSON has been promoted from assistant to superintendent of the Lynchburg (Va.) Mills, succeeding the late James W. Ahmuty.

T. F. GADDY, formerly assistant superintendent of the Fidelity Manufacturing Co., Charlotte, N. C., and the Piedmont Commission Company, is now overseer of beaming and slashing and designer at the Roanoke Mills Nos. 1 and 2, Roanoke Rapids, N. C.

J. C. MASON, president of the Mason Cotton Mills, Kings Mountain, N. C., has been elected president and treasurer of the Daniel Morgan Mills, Cowpens, S. C.

B. A. HOLMES, formerly of Gaffney, S. C., has been made superintendent of the Daniel Morgan Mills, Cowpens, S. C.

W. R. THIGPEN has resigned as overseer of finishing at the Roanoke Mill No. 2, Roanoke Rapids, N. C., and accepted a similar position with the Puritan Mills, Fayetteville, N. C.

BAYNARD WILLINGHAM has resigned as general manager of the Piedmont Mills, Egan, Ga.

C. E. HARPER has resigned as overseer of weaving at the Fountain Inn Mills, Tarboro, N. C.

WM. R. MCELVEEN has resigned as superintendent of the Merrimack Manufacturing Company, Huntsville, Ala.

R. B. RIDDLE has become overseer of carding and spinning at the Glen Raven (N. C.) Mills.

J. E. FINLAYSON, formerly at Martinsville, Va., has succeeded A. W. Roper as overseer of carding and spinning in the Arista Mills, Winston-Salem, N. C. Mr. Roper has gone to Thomson, Ga., to become overseer of spinning and assistant superintendent in the plant of Couch Mills, Inc., at that place.

E. E. SMITH has resigned as overseer of spinning at the A. M. Smyre Manufacturing Co., Ranlo, N. C. He has been succeeded by W. E. Mullis, who was formerly in charge of spinning at the Cabarrus Mills, Kannapolis, N. C.

J. T. HULL has resigned as overseer of weaving at the Blue Buckle Cotton Mills, Rock Hill, S. C.

A. D. ADCOX was recently promoted to overseer of the cloth room at the Victory Manufacturing Co., Fayetteville, N. C.

W. H. GODFREY, formerly connected with the Maginnis Cotton Mills at New Orleans, La., has become cloth room overseer at Steele's Mill, Rockingham, N. C.

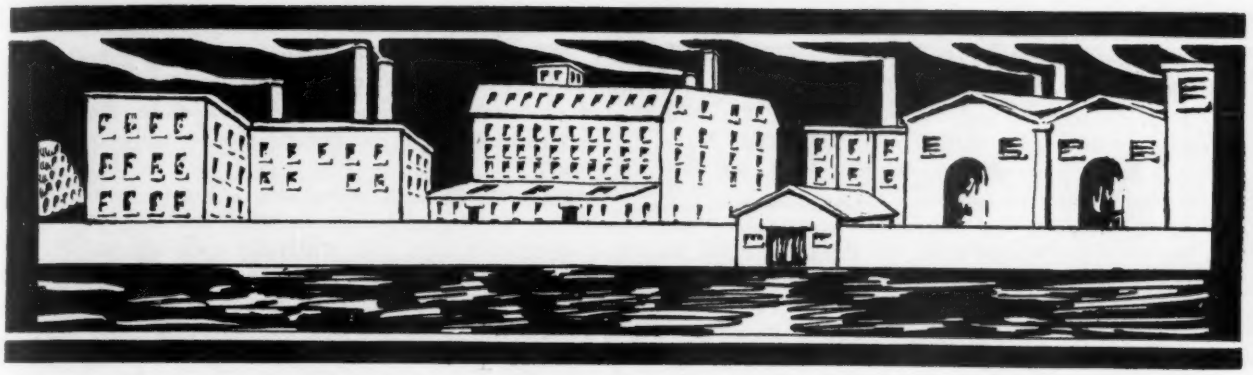
J. H. Merritt has resigned as superintendent of the Victory Manufacturing Company, Fayetteville, N. C., to accept a similar position at the Natchez (Miss.) Mill.

ROBERT WILSON, SR., who for a number of years was assistant superintendent at the Eagle & Phenix Mills, Columbus, Ga., died recently at the age of 71 years, following a short illness of pneumonia. Mr. Wilson also was for a time superintendent of the Girard (Ala.) plant of the Eagle & Phoenix Mills, and for a time had also been overseer of carding at the Newberry (S. C.) Cotton Mills, but for some time previous to his death he had not been associated with the textile industry.

GUY L. MELCHOR has become connected with the Howard Brothers Manufacturing Company, makers of card clothing, twinwire and domestic heddles, hand stripping cards, etc., of Worcester, Mass., and will represent this concern in the states of Georgia, Alabama and Tennessee. He will represent the company in conjunction with their well-known southern agent, E. M. Terryberry, whose office is at 1126 Healey Building, Atlanta, Ga.

Mr. Melchor is well known among the mill men in the southern textile field, and his many friends will note his new connection with interest. For the past several years he has been the representative of the Arabol Manufacturing Company of New York, handling their sizing and finishing materials. Prior to this connection, however, he traveled the southern territory for a number of years as the representative of other card clothing manufacturers, and therefore carries with him to his new position a thorough familiarity and knowledge of every branch of this work.

J. WILMOTH JACKSON has been appointed general manager of the Roswell (Ga.) Manufacturing Company, succeeding S. A. Burts resigned.



Warren Soaps

Preferred Stock

The best quality tallow, palm, and red oils and olive foots, carefully balanced with the purest chemicals for your special purpose.

Uniformity guaranteed by test before shipment.

Warren Soap ***Warren Service***

Warren Soap Mfg. Co.

Established 1870

77 Summer St. - - Boston, Mass.

Incorporated 1890

THOS. J. BRAY has become overseer of carding at the Alice Mills, Easley, S. C. He was formerly second hand at the Pelzer (S. C.) Manufacturing Co.

J. A. HOLMES has accepted the position of general weaving overseer at the Miller Cotton Mills, Waco, Texas. He was formerly overseer of weaving at the Loray Mills, Gastonia, N. C.

A. H. HAMILTON has resigned as carder and spinner at the Ernaldson Cotton Mills, St. Pauls, N. C., to become assistant superintendent at Selma, Ala., for the Eastern Manufacturing Company.

T. R. MORTON has resigned as overseer of carding at the Cabarrus Mills, Kannapolis, N. C., and accepted the position of general superintendent of the Ackerly Cotton Mills, Vernon, Conn.

J. B. TURNER has become assistant overseer of weaving at the Social Circle (Ga.) Mills. He was formerly overseer at night of weaving, slashing and cloth room at the Imperial Cotton Mills, Eatonton, Ga.

EDWARD HILL JACOBS, the founder and president of the E. H. Jacobs Manufacturing Company, Danielson, Connecticut, died on Monday, March 27th, in his 78th year. Although Mr. Jacobs retired from active business life nearly fifteen years ago, he always maintained a close and genuine interest in the canvas loom supply industry, in which he was the pioneer inventor, and his passing is regretted by a large circle of friends and business acquaintances.

L. A. CARPENTER, a pioneer cotton manufacturer of Maiden, N. C., died recently at his home in Maiden, at the age of 65 years. For more than 30 years Mr. Carpenter directed the Maiden Cotton Mills, the first mill in the city, and was interested in the other mills which grew out of the pioneer plant. He is survived by his wife and a number of children, one brother, D. M. Carpenter, cotton manufacturer of Maiden, and four sisters.

ROBERT P. MORNINGSTAR, who was formerly connected with Spier, Simmons & Co., Inc., New York City, has become associated with the Sandoz Chemical Works, 238 Water Street, New York City. Mr. Morningstar has also been connected with the Charles Morningstar & Co., Inc., representing them in the South at one time.

H. A. HADAWAY, formerly overseer of carding at the Fulton Bag & Cotton Mills, Atlanta, Ga., has accepted a similar position at the Winnsboro Mills No. 1, Winnsboro, S. C.

W. H. PEARMAN, formerly overseer of spinning, spooling and warping at the Hartwell (Ga.) Mills, has resigned that position and is now connected with the Equinox Mills, Anderson, S. C.

G. V. TALLENT has been made overseer of spinning at the Adams Cotton Mills, Macon, Ga.

J. A. ASBELL has been promoted from overseer of carding to assistant superintendent at the Langley Mills, Langley, S. C. In his new position he succeeds G. A. Tobey, resigned.

JACK WEST has been made overseer of weaving at the Langley (S. C.) Mills.

G. H. WILLIAMS has been made superintendent of the Victory Manufacturing Company, Fayetteville, N. C. He was formerly overseer of weaving at the Walhalla plant of the Victor-Monaghan Mills, at Walhalla, S. C.

VICTOR M. MONTGOMERY, president of the Pacolet (S. C.) Manufacturing Company, and Miss Eloise Peterson were married at the home of Miss Peterson's parents in Spartanburg, S. C., on Saturday, March 18.

ISAAC COUSER, superintendent of weaving at the Stark Mills, Manchester, N. H., has been promoted to mill superintendent.

CHARLES W. HANCOCK, age 64, who was once superintendent of the Hamburger Cotton Mills, Columbus, Ga., died recently in Girard, Ala. Mr. Hancock was a practical mill man, having worked his way up from sweeper to the position of superintendent, and although he had retired from active work in the mill some time before his death, he leaves a large number of friends in the industry.

A little booklet, designed to relieve depositors of the annoyance of trying to write on bank deposit slips the four or five word names of banks in the small space alloted, has been published by the National Shawmut Bank of Boston. This listing of banks by name is really unnecessary, the book explains, as every bank in the country is designated by a number, known as its "transit number," which identifies the bank and which appears on every bank check. In the booklet referred to, all the commercial bank and trust companies in New England are grouped under their respective cities and the transit number of each is given. Copies of this booklet may be had on application.

National Sulphur Black R, a new type of sulphur black possessing a distinctly red shade, has been developed by the National Aniline & Chemical Company, and bulletins have been distributed. This color is especially recommended for dyeing raw stock in vacuum dyeing machines as well as for yarns in beam and cop dyeing machines, and also for warps and piece goods. Two other recent colors brought out by this company are National Wool Green S and National Quinoline Yellow, both for wool and silk work.

STATEMENT

of the ownership, management, circulation, etc., required by the Act of Congress of August 24, 1912, of COTTON, published monthly at Dalton, Ga., for April 1, 1922.

State of Georgia, County of Fulton, s.s:

Before me, a Notary Public, in and for the State and County aforesaid, personally appeared W. J. Rooke, who, having been duly sworn according to law, deposes and says that he is the Business Manager of COTTON, and that the following is to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse side of this form, to-wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are. Publisher, W. R. C. Smith Publishing Co., Atlanta, Ga.; Editor, L. L. Arnold, Atlanta, Ga.; Business Manager, W. J. Rooke, Atlanta, Ga.

2. That the owners are: W. R. C. Smith, Atlanta, Ga.; E. P. Smith, Atlanta, Ga.; W. S. Cushion, Cleveland, O.; O. A. Sharpless, Atlanta, Ga.; J. C. Martin, Atlanta, Ga.; M. H. Kelley, Atlanta, Ga.; W. J. Rooke, Atlanta, Ga.; L. L. Arnold, Atlanta, Ga.

3. That the known bondholders, mortgagees and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or any other security holders are: None.

4. That the two paragraphs next above giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders, and security holuers as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bonafide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him. W. J. ROOKE, Bus. Mgr.

Sworn to and subscribed before me this 1st day of April, 1922.

(Seal) JOHN C. MARTIN, Notary Public.

My commission expires June 20, 1924.

AN OLD TIMER SAYS

Ever stop to think that practically all the people in the civilized world are busily engaged in giving advice in one form or another?

Just think of the vast amount of money being spent in publications, which are, broadly speaking, devoted to giving advice.

Correspondence schools, magazines galore, books beyond number, are giving employment to thousands and thousands of men who are devoting their entire time to preparing articles which, when boiled down, are advice and suggestions to the readers.

Most every written story has some kind of a moral in it which is a suggestion that you remember the moral and accept it as advice, if the occasion ever arises for its application to your personal career.

Go to a baseball game and you hear nothing but advice and suggestions from the fans to the players, and of course the fan always knows a better way for that player to have made a certain play.

Were you ever an onlooker at a card game or a game of checkers and have that itching feeling that you could hardly restrain yourself from telling one of the players how he was missing the whole darn game by not playing the way you would like to advise him to play? Well, if you could just take that fellow's seat, he would be just as eager to advise and suggest to you.

If a friend takes you out for a ride in his car, you at once begin to realize what a bum driver he is. Why in the dickens doesn't he retard that spark when she's pulling hard on the hill? And to think he has been driving a car as long as he has and doesn't know any better than to give her gas that way. And so on and so forth. You know what I am talking about.

Well, anyway, after keeping these two words—advice and suggestion—before me for several days I have decided that they are very important. Every overseer and superintendent should realize the full possibilities of using them in their daily work.

The relation between the overseer and the operative has taken on a tremendous change in the last ten years. Only a few years ago it seemed we overseers did not have to give much thought as to where we were going to get another operative when one was discharged. But as we did begin to find out that the overseer or superintendent who discharged right and left for every minor deviation from the rules or regulations was not the most successful man in his work, some of us began to take notice and resorted to the more sensible plan of trying to avoid discharging an operative if that operative was capable of taking advice and would lend an attentive ear to suggestions.

It is now an accepted fact that the overseer or superintendent who has the tact, diplomacy, good judgment, common sense or whatever you may call it, the ability to give his operatives' advice in a way that they will profit by it, and to lead them into increased production by suggestions as to how to operate their machines, etc., is the man who is making his mark.

Do not misunderstand me to mean that an overseer or a superintendent should not know how and when to be firm and when to give positive orders. No, the man who does not know how and when to do that is soon going to find that he is really not an overseer or a superintendent, that he has no control over his department or mill at all, and that the time is soon coming when he will lose out.

To illustrate the point: If it were possible for a boss spinner to have the privilege of going to the best mills in the country and hire enough first-class second hands to replace every section man he has, wouldn't he be fixed? He could sure get the production. Why? Well, of course those second hands have come closer in touch with the overseers they have been working with, and they realize the importance of getting production and doing all the other things that it takes to successfully operate a room. They are not nearly so quick to fly off the handle and run a good spinner off, as is the section man who has never had the chance to be as close to the overseer as the second hands. In other words, the second hands have had more advice and suggestions from the overseers.

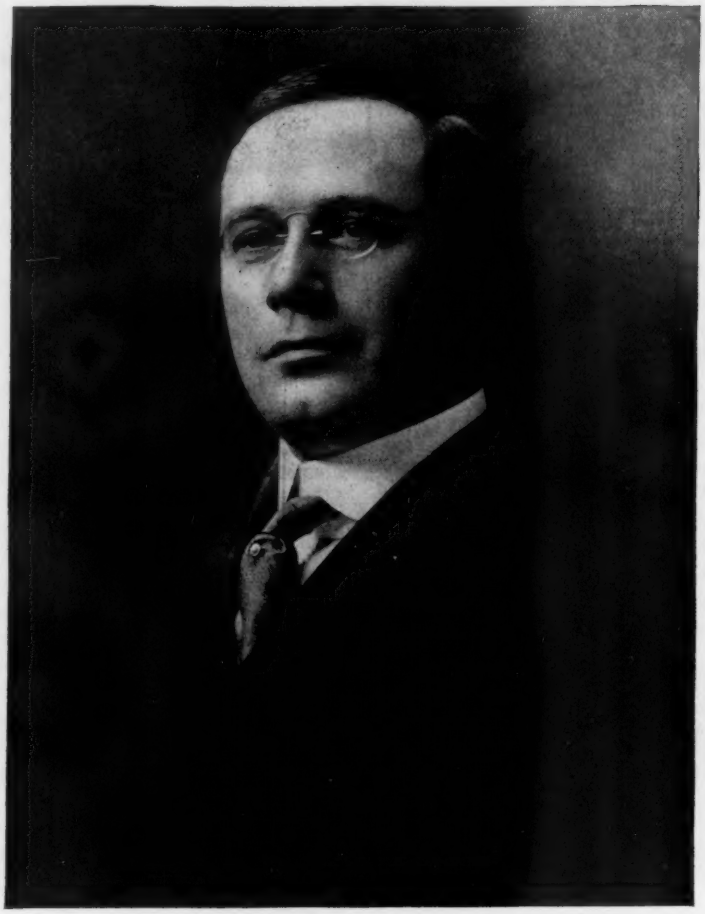
Now do you see what I am driving at? Why not get closer to your section men? Of course you can't make them all second hands, but you certainly can make them much better section men than they are now.

And, incidentally, who is going to benefit most by making better section men? I claim the overseer himself will derive the most benefit.

The trouble with so many of us is that we are so confounded selfish that we don't want to help anybody. We are afraid to tell anyone anything for fear he will know as much as we know. Space will not permit my going into an argument to show the folly of such a feeling on the part of an overseer, but I do know that any overseer or superintendent who is not broad minded enough to see the approaching trend, so to speak, will soon be standing still, and when he is standing still he is going backwards.

Think of the progress the whole world is making by taking advice and grabbing at suggestions. Come right down to concrete illustrations: COTTON is giving advice in the form of technical articles from the highest type and most successful overseers and superintendents in the business. Other overseers and superintendents and section men all

(*Continued on page* 509.)



WILLIAM TONKS

VICE-PRESIDENT, THE UNION TRUST COMPANY, CLEVELAND, OHIO
PRESIDENT, THE ROBERT MORRIS ASSOCIATES

Relative to complete certified audits, the message of The Robert Morris Associates is to the—

BUSINESS MAN: That honesty welcomes investigation, while reticence creates suspicion and precludes the helpfulness of experience.

BANKER: That you shirk your first responsibility, which is to your depositors and stockholders, when you loan their money without full investigation. You even do the borrower an injustice unless you have sufficient knowledge of his business to prevent or mitigate failure.

CERTIFIED ACCOUNTANT: That you have not earned your fee from the business man unless you have made it possible for him to save or make more money. That you have not earned the confidence of the banker unless your figures, comments and certification present a true and complete picture.

William Tonks

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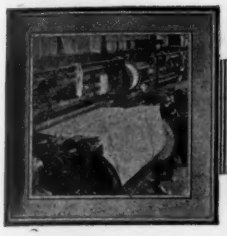

How Other Men Manage

Practical Discussions by Cotton's Readers on all varieties of Mill Subjects

We invite our readers to make use of this department for the discussion of any and all problems arising in the mill or the finishing plant. Questions, answers or letters need not conform to any particular style and will be properly edited before publishing. The editors do not hold themselves responsible for any statements of opinion or fact which may appear in this department unless so endorsed. This department is open to all.

Check Waste at the Source.

EDITOR COTTON:

Every man realizes the importance of giving careful attention to the waste made in his plant, and for the purpose of utilizing everything that can be saved from eventually becoming worthless waste, has probably installed waste pickers, together with a system of inspecting everything cast off from the mill, before finally heaving it over among the rubbish. We have read and heard so much about waste that many men consider it an old song, however, its importance cannot be impressed upon us too strongly.

There is a side to the waste problem which too many men neglect, and that is the small, unimportant things in themselves, the sources of waste. As a fighter who steps into the ring, trained and conditioned to withstand the hardest blows his adversary can deliver, is weakened by the short jabs to his ribs, until the training and conditioning is of no value to him, so is the success of a mill man lessened when he gives too much attention to the redemption of cotton waste and neglects the little sources of waste which are repeated day after day and allowed to go unchecked.

A mill's machinery must be kept in good running condition or it will produce as many full waste cans as it will perfect product. I once knew a mill that had a finisher picker on which the clutch to the feed rolls stuck. It would produce about three laps, and then when the next one was full, the knock-off bar would drop, but the clutch did not disengage, consequently the feed rolls kept feeding until the whole machine was bunged up. One day that picker made three boxes of waste, which weighed 150 pounds. The cost of picking is approximately ½ cent a pound so that waste alone cost 75 cents a day. Add to this the loss of production while the machine was being cleared, the waste of the tender's time, the breakage of belts caused by the bung-up, and the possibility of breaking the picker, and the total cost will be about $1.00 per day for this particular condition. That picker ran for over three weeks in that condition, simply because everyone was "too busy" to fix it.

Possibly the greatest source of neglected waste on the cards is the breakage of ends. It should be remembered that every time the end breaks at the card, it will stop a draw frame of six heads, and for every minute that frame is stopped, approximately two pounds of drawing is lost. Oftentimes the card end breaks because the lap runs out and the stripper does not put a new one in immediately. Figure out the saving if the strippers piece up ends in the cans.

The breakage of comb bands is another cause of end breakage, but this could be practically eliminated if the grinders inspect the bands once a week, and replace any that shows signs of weakness.

At the drawing frames the operatives should be taught to run all the drawing out of the cans, and not dump the last few coils into the waste can, as is often done if the end happens to break. The back drawing cans should not be filled too full, for when they are, and the coils stand 10 or 12 inches out of the can, they are apt to fall over, perhaps into another adjacent can, and stoppage and waste result. In running colored work, special attention should be given to the drawing frames, so that when a color is running out, all the drawing will be used.

The slubber is usually more economical on waste, but the cone belt should receive attention. If possible, two belts should be run, but trouble can be eliminated if the belts are inspected once a week. If the belt shows weakness, it should be changed; the cost of a new belt is less than when all the ends break. The oiler can inflate the cost on all the fly frames by depreciation and loss of production from breakage.

The practice of pulling roving off the bobbins when the creel is running out on the intermediates is a drain on the finances of most mills.

When there is bad roving from the jack frames, it is not always necessary to cut it all off. The overseer can find time to look over all the bad roving and determine what should be done with each bobbin, and not call it waste indiscriminately because the spinner says it is bad roving.

On all the speeders, it is well to be over watchful to see that the bobbins are full, as girls will sometimes doff during their noon hour. The taper should not be so short as to cause the bobbins to snub off. By keeping the builder in perfect condition the overseer will save money for the concern. The practice of allowing bobbins to lie around on the floor is a costly one with the present price of bobbins. Also, order should be the watchword of the fixers in storing their change gears.

The evil in the spinning room is the practice of breaking out a frame. If careful records are kept of the looms, they can be kept running without much breaking out until the creels are empty. The making of bands and band roving should be given attention, and the best that can be made should be considered the most economical.

The knots made in the spooling room should be watched, as a careless girl can stop a lot of looms.

The Fog
That Hangs Over Dye House Efficiency

VAPOR and condensation is the cause of more damage and inefficiency in the dye-house than any other one thing. The fog is not only detrimental to the health and efficiency of the men, but the continual dropping of condensation, which contains a great deal of objectionable acids, has a disastrous effect on machinery, products, and building interior.

Many mills have considered this a necessary evil, or have thought that equipment to eliminate this evil properly would cost more than it was worth. Such is not the case. You can now secure the equipment that is operating so successfully in many mills, together with the engineering service which helped to make the equipment so efficient, and at a cost which is not exorbitant. Such equipment is proving a profitable investment in other mills—why not in yours?

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takes heated air through properly designed steam coils and discharges it through main ducts provided with mechanical distributing nozzles. These nozzles accurately distribute the heated air at the points where the moist air comes in contact with the cooler air. Cool air is provided in the range of work so that there is no increase in temperature below, where the men are at work.

The system is scientific and complete. Our engineer handles the job complete, determines the average vapor, average outdoor temperature, increase in temperature required to prevent vapor condensing, cooling required, and the equipment is installed quickly with no interruption to operation.

We also make drying systems for tenter frame drying through hot air drawn over coils. All our systems use the famous Buckeye Blowers or Multiblade Fans—built for hard service.

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The sizing of the warp yarn is very important. The several size manufacturing companies have experts who can study a mill's problems, and probably can do more for slashing in a short time than an overseer or a superintendent could do in months of labor.

The good or bad work in the weave room is probably centered in the loom fixer. If he allows reedy cloth to go through, the reaction will be noticed in the orders, for the days when just anything sells have passed. If the looms continually bang-off, production suffers.

The practice of the operatives helping themselves to whatever they want should be stopped, as a mill cannot afford to buy supplies for the whole village. A new brush or broom should not be given except in exchange for an old one. If the mill is too strict and requires that the brooms and brushes must be worn out before being returned, it will soon be found that the brooms will be stuck into a pulley and the brushes put into a vise when the operative wants a new one.

All of these points no doubt have been considered, but they cannot be corrected once and then ignored, as they gradually slip back in the routine unless the superintendent is on the watch at all times. M. W. H. (Mass.)

Efficiency in Carding.

EDITOR COTTON:

The value of any productive machine depends chiefly upon its efficiency. Taking the mill as a whole the question of efficiency applies more directly to the cards than to any other machine. This is due to the fact that the card determines the quality of the mill's output to the greatest extent and consequently deserves the greatest care and attention. Two mills on the same goods will often turn out widely different products, and the cause of the difference, when analyzed, almost invariably sifts down to the carding. In one mill it will be excellent and in the other mill very poor —and often with what appears to be practically the same equipment.

This is not always the fault of the overseer or superintendent. They are given so much machinery to accomplish certain results and generally, in order to make this machinery do as much as possible, it is asked for just a little more than it can do. This leads to overcrowding, and it is almost always on the cards. It is safe to say that very few mills have a sufficient number of cards to do the work required of this process and do it well, and considering the important bearing this process has on the running of the work, the strength and evenness of the yarn and the cleanliness and general appearance of the woven cloth, it is astonishing how difficult it is to persuade mill managements to buy more cards when they are needed. However, the mark of the good workman is the ability to do well with the tools at hand, and it is chiefly to that end that this article is designed.

The first point to be considered, and the most important for cards as for every other textile machine, is that of speed. Most mill men will agree that many a card that was properly set has failed to do good work on account of excessive speed and overcrowding. Makers' catalogs will give the cylinder speed as 165 r.p.m. This is frequently exceeded in practice up to 175 r.p.m. and over. There is no doubt that a card will operate at a speed considerably in excess of 165 r.p.m. for the cylinder, and it may be justifiable in some cases and unavoidable in others, but as general rule, it is not good practice. This has been determined by long experiment and by the experience of numbers of practical men to be the most efficient average speed for all classes of work, giving the most satisfactory cleaning of the fiber combined with the longest life of the clothing.

Besides the cylinder there are a number of other moving parts to be considered. The licker-in, primarily installed as a cleaner, will by its carding action cut the staple if this action is too severe, and the breaking strength of the yarn can be seriously affected if the speed is too high or the adjustment faulty. For Middling 1 to 1¼-inch cotton, the licker-in speed in a certain mill was 625 r.p.m. When this was cut to 380 r.p.m. the breaking strength went up ten pounds. From 400 to 450 r.p.m. is the speed generally recommended by the builders.

Flats can be speeded to the satisfaction of the overseer or superintendent. This is probably the only place that an increase of speed can be beneficial, as it will result in the removal of more short fiber and dirt. There is no doubt, however, that it will also take out more good fiber. There is hardly a mill that has not experimented along this line somewhat with resulting variation in speeds between mills, but this is a matter determined largely by the nature of the work and the quantity and quality of strips considered desirable.

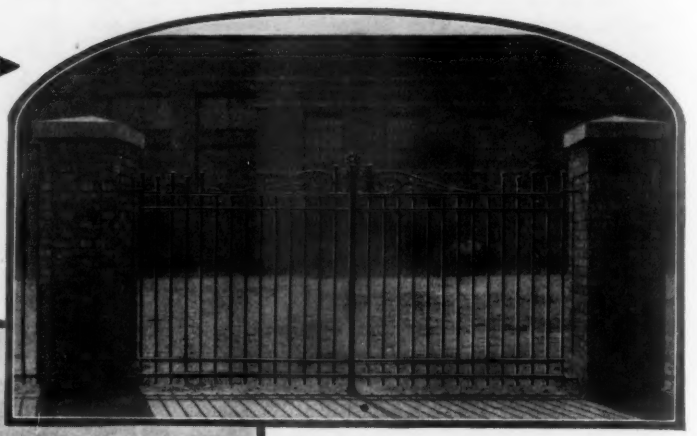
The next important factor in the efficient operation of cards is the setting of the various parts in relation to each other. There is no hard and fast rule to cover this subject, as it is influenced too greatly by the quality of stock being run and the amount of cleaning desired. Even after this has been determined it will be found that two cards set exactly alike will very often not do the same work. This applies more generally to the licker-in screen, the cylinder screens and the front and back plates, and these parts must be set largely by the judgment of the card grinder.

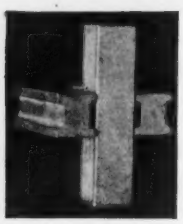
Beginning with the feed plate setting, an important point is the shape of the nose on the feed plate. The distance from the bite of the feed roll down to the shoulder on the nose of the feed plate where the cotton is taken off, should be about an eighth of an inch longer than the staple being run. The angle at which the nose recedes from the licker-in should be such that the licker-in will comb about three-fourths of the fiber before the feed roll lets it go. In starting up a new mill the machine builders always furnish the cards with feed plates of the proper shape for the work intended, but as time goes on it almost always happens that it is decided to go on other lines of work and the staple is changed, with the result that the card is working a class of coton for which the feed plate was never intended. This is a matter which is seldom given the proper thought.

The following procedure should be followed in setting up a card for 1-inch staple: Before grinding the card, the licker-in and feed plate should be loosened and backed off from the cylinder slightly. After grinding, set the licker-in to the cylinder with a 10 gauge, bolt the licker-in boxes tightly in place and try the setting again to be sure it has not changed. Then take out the licker-in and set the cylinder screen. Set the back of the screen 20 to 30 gauge from the cylinder, the middle about twice and the front about three times this distance. A considerable latitude is

Anchor-Weld Double Gate Type GD3-1, with ¾″ grooved square pickets, hung between brick piers at an entrance to the property of Joseph C. Price Co. at Cleveland, Ohio. Permanently true and rigid without diagonal bracing.

Part of an installation of 700 ft. of Anchor-Weld Railing at the above property. This railing is 6 ft. high, set between I-beam galvanized posts, firmly anchored in the ground. Perfect in alignment, without loose pickets or sagging rails, such a railing will last indefinitely.





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2399-G

allowable here, and after the card starts up it will probably be found necessary to judge the setting altogether by the amount of fly thrown out.

Now take the shrouds from the ends of the licker-in and put them in the boxes. The shrouds are usually of the same diameter as the licker-in and the ends of the screen can be set to them. In case the screen is battered up, or if for any reason it is desired to get the licker-in setting all the way across, it is necessary to construct a dummy to set to. This can be made of a piece of shafting the size of the licker-in shaft with a wheel the size of the licker-in. The wheel can be made of hard wood or an old pulley or a gear blank, and when the shaft is placed in the licker-in boxes the wheel can be slid back and forth on it so as to show the setting of the screen the whole way across.

Set the front of the licker-in screen one full set of gauges from the shrouds, and the back so as to regulate the waste, usually about an eighth of an inch. Put the shrouds back on the licker-in and the licker-in back in the boxes. Set the mote knives 17 gauge from the licker-in. Mote knives are very often crooked and spring in or out in the middle. The licker-in dummy will be found very useful in observing this and making this setting. A great many grinders will set mote knives as close as possible without striking. Ordinarily the feed plate is set to the licker-in with a 10 to 12 gauge, but when running a weak staple, 15 or even 17 will give better results. Light weight laps may permit a slightly closer setting. It should not be forgotten that the closer the setting the more danger of injuring the staple, while the wider the setting the less cleaning will be done and the fiber will be delivered less evenly to the cylinder. The correct setting is a medium between these two and must be determined by the nature of the work.

The back knife plate should be set to 29. Flats should be set very carefully; 10 to 12 gauge will give good results. After setting it should be seen that the flexible band is locked tightly in place and the settings tried again to make certain they have not changed. The front knife plate is set so as to regulate the amount of strips wanted. Generally the lower edge should be closer to the cylinder than the upper edge. Settings vary all the way from 17 to 34, but the closer the setting the lighter the strips within a limited degree.

The doffer should be set so as to take the good staple from the cylinder and carefully bolted in place. Generally a 7 to 10 gauge is sufficient for this. If set too far from the cylinder the doffer will deliver a cloudy web due to the cotton not being taken from the cylinder evenly. The doffer comb should be set close enough to the doffer to take the web off, but not so close as to strike the doffer; generally 10 gauge, and the comb should be raised and lowered until the proper tension is obtained between the doffer and the trumpet. Set the flat comb close enough to the flats to take the strips from the flats without striking. This will be about a 10 gauge.

There is nothing that bears more directly on the correct setting up of cards than the condition of the floor upon which they stand. It is not possible to set and maintain a relationship of a few thousandths of an inch between the moving parts of a machine that rests on a weak, vibrating floor. Modern facory buildings are being constructed with a view to the elimination of all vibration so far as is possible, but such a provision is seldom found in the old type of construction, and many a card grinder, surrounded and confused by the noise from pickers, fly frames and often looms, sets up his card on a shaking floor in a sort of catch-as-catch-can method and lets it go at that. Whenever possible, cards should be placed in a separate room so as to shut out all other noises, and should rest on a very solid floor, preferably concrete. In any event they should be leveled up periodically.

The first grinding job the writer ever had was in a new mill where the cards were in a separate room and everything looked ideal for good work. The floor, however, which was of wood and about three feet from the ground, kept settling and when a card got sufficiently out of level the cylinder would rub the arch. Whenever this happened the overseer would take a big bar of iron that stood handy in a corner and sliding it along the floor would whack first one corner of the card and then another until the rubbing stopped. This looked rather queer to the grinder, but being rather "green" and having just bluffed himself into the job he decided it would be best not to say anything. In the course of time the frames of the cards got all out of square and things were in rather a mess when that overseer left and another took charge. When the new man saw the condition of things, he went straight up in the air, and only a natural gift of eloquence combined with a quick leveling up and straightening out of everything saved the poor grinder the job.

Given the correct speed and the proper settings there still remains a great deal to be done. After grinding, the grinder should go over his card thoroughly while setting it up. This does not mean that all settings should be made every time. Screen settings once made are seldom changed, and flats can be set every other round, but the whole machine should be looked over with an eye to the general condition. If cotton blows out between the cylinder and the frame, it should be removed before it stops the card or causes a fire. All slow moving parts should be tested to see that they move freely and are properly oiled. The licker-in should be examined for damaged teeth and these straightened if there are any. The careful grinder knows of many things that can be done and should be done at this time.

In the actual running of the cards there are other things to be watched. Any mill man will agree that oiling is a matter of prime importance, yet most mill men will allow it to be done by almost any kind of a hand who probably is oiling because he doesn't know how to do anything else.

There is only one way to strip a card, and that is to strip it clean. The stripping force should never be in such a hurry or have so many other things to do that they cannot thoroughly remove the strips from the cylinder and doffer. In these days of vacuum strippers, this problem is not as difficult as it has been, but it is a point to be watched at all times. The number of times a day and the number of cards that can be stopped at one time while stripping must be left to the overseer's judgment.

Keeping the machinery clean makes better work, and general cleanliness all over the room tends to raise the morale of the help. Belts should be cleaned, not once in a while, but constantly, so as to eliminate slip and by maintaining the proper relative speed of the different moving parts of the card, hold the production and cleaning effi-

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ciency to what it should be. A separate article could be written on the grinding itself.

The watchword of the card room should be "Care." The overseer is only human, and knowing that, he should make due allowance for the hands under his supervision, but should not let them drift back into careless ways. Most overseers know what should be done; few actually accomplish it, but by setting a high standard as their mark and striving constantly to hold it, a high degree of efficiency can be reached and maintained. J. K. (Ala.)

An Old Timer Says—

(*Continued from page* 501.)

over the country are eagerly drinking in this advice and making themselves better and more efficient men in their respective lines of work.

One superintendent subscribed for COTTON just because the solicitor came along and the subscription price was so small that he gave him a dollar to get rid of him. A few weeks later that superintendent came to his office late one afternoon pretty badly worried over a little trouble he was having in the card room. His first number of COTTON had just arrived and was lying on his desk. He remembered that dollar as soon as he saw the magazine and as he casually turned through the pages looking at the advertisements he did forget his troubles for the moment and turned on into the reading matter. There he found a pretty hot discussion between several contributors and, strange to say, one fellow was talking about his own troubles that fitted pretty well in to the case of this superintendent. He took COTTON home with him. He studied the article carefully, and, to make a long story short, he went to the carder with the idea next morning, and it worked. That man is now a regular reader of his magazine.

You may think this is fiction, or, perhaps, you may say that the publishers of COTTON put me up to telling this particular story, but if I had the space I could name one case after another to show the importance of giving and taking advice.

Try the suggestion on your section men, Mr. Boss Weaver, Spinner or Carder, and watch your production go up and see what a different feeling you will have toward those men. You no doubt will be surprised to see how they will respond, how they will fall in line, how they will cooperate.

And as for you, Mr. Superintendent, well, I'll leave it to you.

It takes constant vigilance for a man to keep his job right up to its highest efficiency. If you can't find anything to do, start in to walking up and down your alleys. Ask the operative how the work is running, which machine runs the best, which one runs the worst. You will soon find out so much to have done that all the section men will wonder how you can see so many things anyway.

The superintendent needs the cooperation of the overseers. His first purpose should be to inspire them to loyalty to the firm by which they are employed. A loyal set of men are full of suggestions and will go to extremes to support their leader.

Some Remedies for Static.

EDITOR COTTON:

In his article on "Static Electricity" in the March number, "H. J." has sprung a good one. He has told us something we always knew, but if I am right, he has started something that will eventually prove beneficial to the readers of COTTON.

Electrification should not be confused with electricity. Electrification always involves a change in the normal amount or condition of the electricity a body contains, the change requires the expenditure of energy for its production, and energy is given out when the electricity reverts to its normal matter, so electrification is not electricity, but the energy electricity possesses by virtue of its displacement.

Friction is not the only way electrification is produced. Chemical action, percussion, physiological action, and other disturbances in the condition of matter also bring about disturbances in the electric condition of a body.

It is quite possible that these cases may all be ultimately reduced to that of contact. Take two bodies that have different properties, one that has too much electrification repels a body in the same condition, and attracts one in the opposite state; also, the one with too little repels a body in the same condition, and attracts the other. The terms positive and negative, as used in connection with electrified bodies, are conventional terms to denote which of the two states a body is in.

Static electricity in our cotton mills is due to the bodies not being in a like condition. For the reasons given there are many cotton fibers upon which atmospheric conditions have a greater or less effect, especially in the processes of manufacture, yet it is only a matter of degree.

Let us consider here the structure of the cotton fiber. Its hollow spiral or collapsed tubular form, its delicate waxy walls, and its wonderful adaptitude for drafting and twisting and manipulating under proper atmospheric conditions, are well known, as well as its refractory nature under adverse conditions of humidity and temperature, and its fretful disposition in the presence of static electricity.

The direct result of changes in humidity and temperature of the atmosphere is a corresponding change in the amount of moisture hygroscopically contained in fibers exposed to it, which in turn affects consequent and relative changes in their physical condition, these physical changes are mainly in the nature and amount of the twist in individual fibers, and the extent of their brittleness or pliability as the case may be.

The normal amount of moisture in cotton is estimated to be about eight per cent, although the amount of moisture varies somewhat with the locality in which the cotton was grown and upon climatic variations from year to year. There is a very marked difference in the physical properties of one crop as compared to another, and any attempt to work one year's product with hard and fast rules deduced from the previous year's experience will be disappointing; the behavior of one crop when worked at a certain standard of moisture in the different departments is a guide for the next one, but not an infallible rule. Again, the problem is complicated by the variable amount of oil in the fiber; many planters now realizing the advantage of leaving

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the seed in the cotton as long as possible before ginning, so that the fiber may absorb as much oil as possible.

The friction of machinery, the friction of moving belts, and many of the operations carried on in manufacturing establishments generate static electricity.

Dry air is a poor conductor of electricity, and moist air is a good conductor; in a dry atmosphere, therefore, electricity accumulates until everything is heavily charged with it, so that there is a strong tendency upon the part of dust and other minute particles and the individual fibers or materials in process of manufacture, to disengage themselves and fly off into the atmosphere. From these facts it must be admitted that air conditioners and humidifiers are essential in every cotton mill. Granting that what "H. J." says in the seventh paragraph of his letter is true, is it not a fact that the use of humidifiers in the mill in question would improve the quality and increase the production? I think so. No one knows, for they never had a humidifier of any sort in the mill.

Most all practical carders know how to go about it when the room is charged with electrification. One way is to moisten the air, another is to wet the floor, and still another is to turn on the steam. The combs on the doffers are lowered, etc., all of which, as stated, is understood.

But in the following cases we are helpless. Having in mind what has already been pointed out, let us assume that we have a large amount of laps on hand, it is winter, and the picker room is allowed to be filled with cold air. Then let us imagine that these laps are placed at the back of a card in a warm room. No matter what we do in such a case, we will have a great deal of trouble, and the only remedy is to let the laps stand in the room where they are to be run.

Remember, two bodies that have different properties repel substances in a similar condition.

There is nothing more discouraging than to have electrification on the drawing frames and cans. Heat is the only remedy.

A book or two could be written on the subject, and I feel I have already taken up more than my share of space. Now let's hear from some of the other fellows; this is a valuable discussion. Wash (Mass.)

EDITOR COTTON:

The ghost that stalks around our cotton mills seems to get in his most efficient work when he floats in as static electricity. Ghost hunting always has been fruitless, that is, the hunt has been side-tracked and bumped up against something tangible, but the mysteries uncovered are always interesting, fascinating and usually useful. Now if we hunt static electricity long enough we will run off the track and probably find the thing that is causing it to interfere with our manufacturing. "H. J. (Ala.)," in the March number, has stirred the ghost up, so let's all help to keep him up and out forever.

Before considering the problem as we know it now, suppose we look into the future and see how static electricity will be treated. Past and present endeavor seems to be to kill the electrical charge where it shows itself, but the sure and the only real cure is to prevent it from ever showing itself, therefore, sometime, electrical experts will probably work out a barrier to static electricity similar to, but more positive than, our lightning protectors.

The first battle has got to be to find absolute knowledge of electricity. There is very little positively known of the origin of electricity. It exists and wonderful uses can be made of it, but should it suddenly cease to be, it is impossible for anyone to say what caused it to disappear, or how it could be brought back, or what the results would be to this earth. It has long been studied, even the earliest histories showing that the ancient Egyptians knew its actions. The Greeks, at the time of Thales, 600 B. C., knew that when amber was rubbed it would attract bits of paper. Possibly we can compare it with gravity; we know it exists, but we know not what to do to preserve it. Possibly Professor Einstein, in his study of relativity, will find the source of electricity. This lack of basic knowledge is the primary reason for most men evading the static electricity question, but the problem will never be solved by evasion.

Electricity is either a substance or a force. Some textbooks tell us, "it is the same as the ether, an elastic and extremely thin substance, that exists everywhere, even between the molecules of solids and liquids." A textbook on electrochemistry says, "All substances are composed of very minute particles known as molecules, which in turn are composed of still smaller elementary particles called atoms. Until recently the molecule has been looked upon as being the smallest particle of matter that could exist alone or in a free state, the atoms never remaining free, but always uniting with other atoms of the same or of different elements so as to form molecules. Recent physical investigations indicate that in every solution there exist members of free atoms or groups of atoms smaller than molecules, which are called ions. The ions tend to appear at the electrodes, those at the anode being called anions, those at the cathode being called cations. Each ion is believed to carry a static charge, by which it is attracted to the oppositely charged electrode."

Electricity is usually classified according to its motion, but it is the same substance in every case. Electricity at rest is static electricity. Electricity in motion is current, in rotation is magnetism, in vibration is radiation. Static electricity consists of stationary charges which show themselves by attracting or repelling other bodies. Static electricity is produced by chemical action, by magnetic induction, by heat, by friction, by influence and sometimes by pressure. A static charge travels over the surface while a current spreads through the conductor, therefore, a static charge will creep along glass, wood or cotton, which are usually considered as insulators.

The greatest amount of static electricity in the mill is probably caused by the belts. The belt causes it partly by internal friction in the belt as it bends around the pulley, partly by friction between the belt and the pulley, partly by friction between the belt and the air; and largely by induction as the charges are separated by the motion of the belt. On a wet day the belts become more or less damp and conduct the charge to the shaft where it is carried away, but on cold dry days the charges cannot be carried off as everything becomes insulated. However, the moisture in the air does not affect the production of the static charge, it simply provides more or less conductivity to carry the charge away. If the air is saturated with steam, everything will become dampened and the charges will be carried away. Putting hot water on the floors helps to moisten the air, and is a very good idea for ground floors, where the water

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cannot leak through and damage anything below. I have tried all of "H. J.'s" tricks and found practically the same results. They all help a little, but do not cure.

There is a concern making electric neutralizers for cards and drawing frames, and their system does more to defeat the static charge than anything else that I ever used. I think the editorial staff of COTTON can find the makers of this neutralizer for any who desire to know about them, as I do not care to mention the name in this letter.

The neutralizer consists of a bar, fitted to the card directly over the doffer comb, which carries a series of triangular points, set at one inch intervals, which are all connected to one wire, placed conveniently by the side of each doffer, and usually running through the floor, where it connects with a feed wire. This feed wire carries 10,000 volts, stepped up from the main line, and when this current is conducted to the triangular points, it neutralizes the static charge and kills it. The drawing frames are rigged up similarly, except that a nozzle is used over every coiler head, directly under the calender rolls. This nozzle carries a very fine wire which runs back to the feed wire.

All of these practices and devices will not cure our troubles, however much they help to get the cotton through. In all my experience, I have never found that white cotton acted as badly as dyed cotton on the cards or drawing, and for this reason, I believe the cause of our troubles is in the dyestuff. On cold mornings, sometimes, the white will go bad on the cards, but a sprinkler can of hot water sprayed onto the floor around the cards will stop it. But the colors, well some of them are ten times worse than Sherman ever thought war was. I said *some of them,* and this again strengthens my theory that it is the dyestuff, for it is always the same colors that kick up. "H. J." had trouble with his yellow. I never had any trouble with mine and I dye it direct. The bleach is the cause of more trouble than everything else and as others seem to have the same trouble it would look as though the cause is in the bleaching. Our dye chemists can give us further light on this question if they will trace back the ingredients of the various dyestuffs, which might induct electricity. M. W. H. (Mass.)

EDITOR COTTON:

I was much interested in reading, in the March issue, of the trials and tribulations of "H. J. (Ala.)" when he was bothered with static electricity in the card room while running colored and bleached cotton. I have carded colored and bleached cotton, in a mill where we did not have humidifiers, and in no case did I ever have his trouble, except in extremely cold and windy weather. And when I say "cold," I mean it was cold sure enough—snow on the ground 24 inches, and ice on the river thick enough to hold a double team loaded. In this kind of weather we would have trouble. But here is the remedy we used: We opened steam jets in the room, kept all the doors closed, and when the window panes got cloudy and wet from the effect of the steam, things went off all right.

I would suggest to "H. J.," and others having this trouble, that they try this recipe, and believe that they will be greatly helped: Have the dyer wash the cotton thoroughly and dry it, and when ready for a mixing, spread the cotton on the floor about 12 inches thick and in as large a space as there is floor to spare for the purpose. Then get a one-gallon sprinkler, fill it with *hot water* and two tablespoonsful of borax, and when this is dissolved, sprinkle it over the cotton. After the pile of cotton is gone over, take a fork and turn it over in the same manner as working a compost pile.

Care should be taken that the whole surface of the pile is sprinkled, and if one can won't do it, fill another and use it. I think anyone will be repaid for his trouble if he does this. A little steam in the room in cold, windy weather will help considerably, as steam is the most reliable method of killing static electricity that I know of. I would like to hear from "H. J." again some time on this subject.

W. S. R. (Ga.)

Grinding and Setting Cards.

EDITOR COTTON:

After reading the letter from "Mike (Ga.)" in the January number, on the grinding and setting of cards, I want to express my views on certain points he brings up in his letter, because our opinions do not exactly coincide on all these points.

"Mike's" first statement is that a man can set up two cards side by side, grind them and then set every point the same and still not get the same results from them. However, my experience leads me to believe that if the two cards are of the same make, clothed with the same make of clothing and the same number of wire, that there must be some difference somewhere in the settings, provided both cards are using the same kind of stock and the same weight lap. I think "Mike" is a little wrong on this.

I agree, with "Mike," that the licker-in should be kept in good shape and set to the proper setting, but, oh, my!, if the licker-in was all there was to worry us in our carding department, we certainly would be "sitting pretty."

"Mike" says, "When you see a licker-in set to a No. 7 gauge, if you will look into the spinning room you will find that they have weak yarn and that it is almost impossible to keep the guides clean." Well, all I've got to say is that we are running 1⅜-inch staple peeler cotton at our mill and I have every licker-in I've got set to a jam-up 7, and I believe our yarn has as good a breaking strength as anyone's 80s. "Mike" also advocates a No. 17 setting for the feed plate, while I am getting along fine with No. 7 setting at that point. I have my mote knives set, both top and bottom, to a No. 5, while he uses a 10 gauge for this setting. He is using the same setting for his back plate that I am using—bottom edge, 28, and top edge, 17—but where he has his flats set to a No. 12 I set mine to a No. 7.

I believe, with "Mike," that the licker-in should be kept in good shape and set to the proper setting. He says that the licker-in is important, and I agree with him, but I do believe that the most important part of the carding process comes between the flats and the cylinder. Now I don't mean that all the carding is done between these points, for the feed plate has its part to play and the licker-in has its part to play, and the mote knives and the licker-in screens have their parts to play; but the setting of the flats is important above all these because the majority of the motes and neps come in the flat strippings. The cylinders and doffer both should be ground sharp and set up well; then the back should be set up and the web examined; then the flats should be ground sharp and set to a good, tight 7, the web examined again and

A SKY LINE AND A DYE LINE

On one side of the picturesque and historic Hudson is the most beautiful sky-line in the world, while on the opposite shore, buttressed by the Palisades, is a great manufacturing center, including Newark and environs.

One of the first to realize the natural geographic advantages of the section for manufacturing purposes was the Central Dyestuff & Chemical Co., which undertook the manufacture of an extensive line of dyestuffs back in 1898. The company makes most of the intermediates entering into the manufacture of its Acid, Basic, Chrome and Direct Colors.

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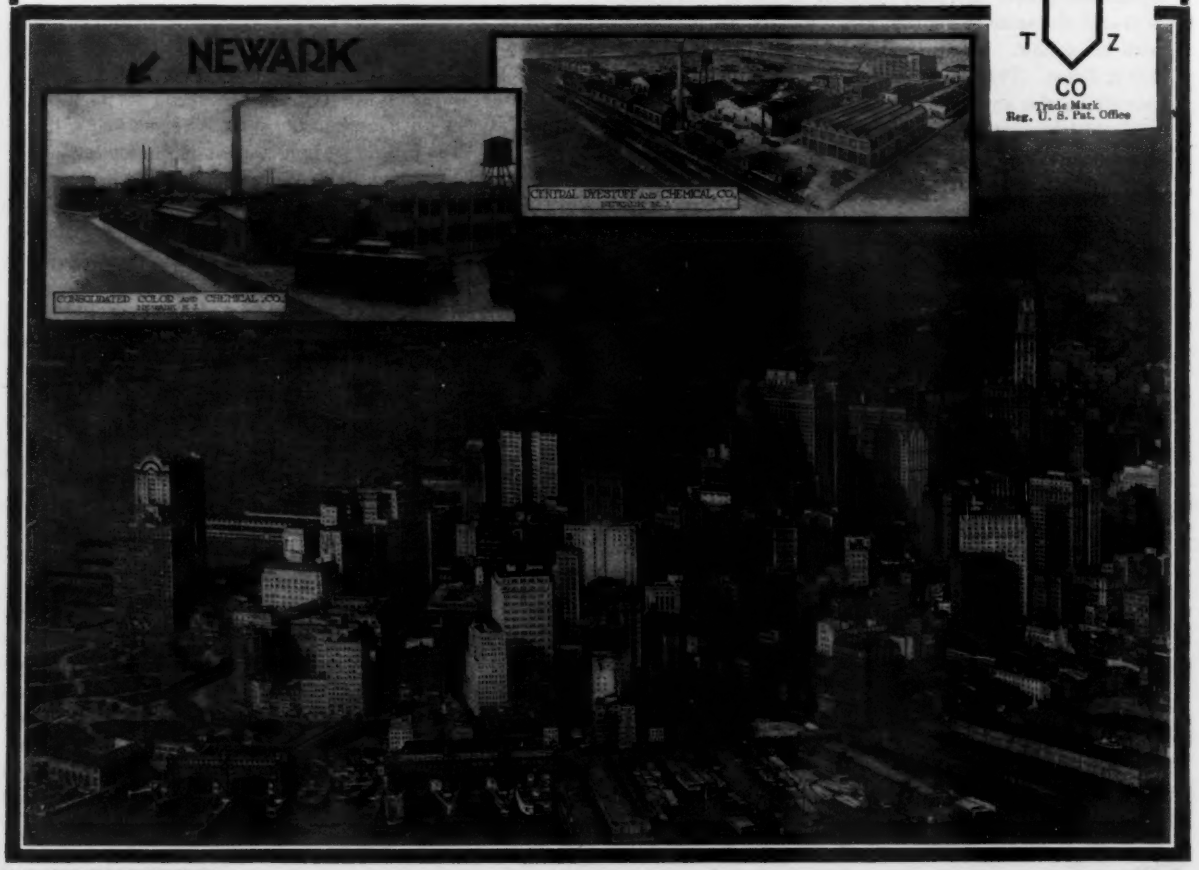

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the difference noted. This test should prove the value of the work the flats perform. I have set the flats on cards on the second floor of mills to a good, tight 7 with good results—and no flats were faced.

"Mike" also advises a No. 17 setting for the doffer comb. I wish to say I have gotten along all o k with a No. 10 at this setting. I agree with him, however, when he says there never was a work more interesting than card grinding and that we ought to try to make every one do better work than the last one.

Now "Mike" might get along fine with his settings, but I never could. He is trying to tell the readers how to get the best results in carding. So am I. You see how we differ. But we two can't settle the matter definitely just by ourselves. Let us hear from others.

Ted (N. C.)

Some Cloth Room Suggestions.

EDITOR COTTON:

We see few letters from cloth room men in the department "How Other Men Manage." In order to start some of them to telling how they do their work to secure the best results, I am going to discuss a machine that seemingly gives little trouble, but which may cause more difficulty than it is usually given credit for. This machine is the winding calender.

On the front of this machine the cloth usually passes over two or more tension bars in order to give it the required tension in passing over the "stretch" or spreader roll. This roll is a valuable adjunct to the machine, but like the measuring roll it is often left off. Its purpose is to smooth out wrinkles, straighten turned down selvages, and, when the goods are steamed, it prevents too much drawing up or shrinkage in width as it keeps the goods stretched until they pass on into the calender rolls proper. This stretcher roll is very simple, yet it is productive of some abuses that are well worth mentioning.

The roll consists of brass or wooden plates diagonally cut across their face in grooves to a rather sharp edge. These plates are driven by cam rolls or balls working down into circular cams so set as to cause the plates to travel from the center of the cloth toward the selvages from the time they strike the goods until they leave it. Then they are redrawn during the remaining half turn of the roll so as to come out again on the upward turn.

The principal abuse of this roll is too little or too much oil. I have seen them stuck hard for lack of oil, and I have also seen them ruin quantities of goods with oil spots before the trouble could be located. Many mills having oil spots they cannot otherwise account for would do well to investigate these stretch rolls. The manufacturers have supplied these rolls with oil holes, thus encouraging the use of a light thin oil. This I never allow, experience having shown me it was unsafe. I use a heavy grease on the cams. Of course, in time this gums the cams and the roll has to be taken apart and cleaned, but the goods ruined by one overdose of oil given by an ignorant or careless hand will be more expensive than the cleaning of the roll will cost in a dozen years.

Then another abuse is the wrong setting. When these spreaders leave the shop this roll and its boxes are properly set, but nuts will slip and curious hands will tinker, and I have seen rolls running in the very reverse position from which they were intended to run, and no one seemed to know or care. When in this condition they do more harm than good. They are set in stationary boxes, the shaft never turning. When not set correctly, loosen the set screws in the boxes and turn the roll shaft with the machine standing until the roll's widest stretch is nearest the nip; then fasten again. The distance the cloth has to travel from the widest spread of the roll to its contact with the calender roll should be the least possible.

The calender rolls proper consist of two soft iron rolls, one run directly on top of the other. They are usually run with the top roll going a trifle faster than the bottom roll, giving a dragging or ironing effect on the goods. This ironing may be increased or it may be reduced by interchangeable gears to suit the needs in hand. The rolls may also be heated with steam or run cold. The cloth passes down under the bottom roll, up between the two rolls and is then wound on a wooden roll which revolves on the top roll by friction. Where the goods are not desired to be calendered, they may be passed under the bottom roll and left from between the two rolls, being brought directly up in front to the winding roll and allowed to wind up backwards, so to speak.

There is a pressure device arranged by means of a friction wheel, with an adjustable leather friction, that holds the bearings down upon the journals of the wooden cloth roll just as hard or as loose as may be desired, thus governing the density of the roll.

This part of the machine is simple and hard to get out of order, yet susceptible of some mismanagement, the most common of which is to allow the rolls to run too hard together or too far apart. If run too close together every wrinkle or turned selvage will be cut by the pressure and every hard foreign substance in passing through will also cut the goods. If run too far apart they allow the goods to pass without any of the ironing effect intended. A clever trick of some operators, because of the lack of either knowledge or interest on the part of the man in charge, is to play safe by opening the rolls. On goods intended for converters this is usually not so serious save that it does not give the goods the feel and appearance that they might otherwise have. These rolls are adjusted by a wedge-shaped bolt with nut attached that may, by screwing the nut, be drawn to any desired length directly between the boxes at the end of the rolls, thus raising the top roll off the bottom at will. In setting this machine, where I desire to calender goods at all, I take a piece of ordinary writing paper and raise the roll until I may pass this between them from end to end with but little difficulty.

F. T. C. (N. C.)

Educating Sub-Foremen.

EDITOR COTTON:

I notice that a large percentage of the letters to your "How Other Men Manage" Department, which is the part of the magazine I read first nearly every month, deal with speeds, drafts, settings and other things relating to the different machines throughout the mill, and I am sure that these articles are written by overseers and superintendents who are practical men. I get a lot of help from these discussions, and I would like to fall into line and present

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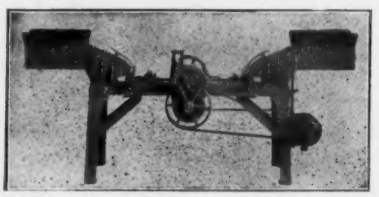

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THE TERRELL MACHINE CO., Inc.

CHARLOTTE, NORTH CAROLINA

a new subject, that of the best way to get these articles before those men who are most in need of them—the section men and second hands.

Certainly we must of necessity depend on the section men and second hands to carry out our orders. Then if we must depend on them, we should make an effort to interest them in bringing up their jobs to the highest standard of efficiency, looking at all times for quality.

My plan is this: When I read an article and find an interesting idea, I mark it. Then I ask my overseers if they have read such and such an article, and tell them that some man claims that he has something that will do so-and-so, also suggesting that we try it in a small way. If an overseer hasn't the magazine himself, I turn my copy over to him and also expect him to call the idea to the attention of the section men and second hands. In this way, in a short time, the overseers and second hands and section men throughout the mill get the habit of reading and using other men's ideas in their work, and in this way they become more interested and find ways to improve and develop ideas of their own.

It is well known that there was a time when a few mill men were afraid to let the men under them know that they were trying the ideas of somebody else, or that they didn't know it all, but I think that day has passed and most of those men are out of the game.

Don't understand me to say that I try every idea and theory that I see advanced. But I do try those that look good, sometimes modifying them a little to suit my local conditions. And above all, I try to interest men and second hands in reading articles relating to their work, and try to let them know that I am willing for someone else to have an idea and that we will, after fair consideration, give their ideas a trial if there is anything to them. If not, I explain why they won't work.

I am not setting this system up as a standard, but am merely giving my opinion, and would be glad to hear from other readers to have a different system that is better. I would like to see some discussion along this line, and would also like to ask a question of the overseers and superintendents. Is it an easy matter for them to secure good men for section men and second hands, men who can be depended on to take the job higher up when the time comes?

In training section men I have found it a very good rule to first consider the things that interested me when I was in the same position. I know it was always a pleasure to me for an overseer or superintendent to stop long enough to explain things that they wanted done, and the results they hoped to obtain. Take a card grinder, for example. Card grinders are human, just like you and I, and when they are told to make certain changes in their settings, they would appreciate being told what results the overseer or superintendent hopes to gain by such changes. I hear somebody say that all card grinders worth having know what the results from any change of settings will be. Maybe yes, and maybe no. Anyway, no man, if told in the right way, objects to the overseer explaining what he hopes to accomplish, and when two heads are together to accomplish a result, there is likely to be something done.

Someone may ask, "Can section men be picked up just anywhere?" No, no more than cabbage can be expected to sprout from turnip seed. But if you have cabbage plants, and give them the proper care and attention, you will soon have cabbage for the table. Set them out and leave them to themselves, and you may have a few little warped-up things that nobody would want.

The superintendent who selects his men with care, and who gives them the proper attention and encouragement, will soon have an organization of which he can be justly proud.

Reader (N. C.)

Roller and Belt Shop Economy.

EDITOR COTTON:

Many of the larger mills have a roller and belt shop. Some are well conducted; others savor of anything but real economy. Belting, roll covering skins, roll covering cloths, cement and all supplies and tools for this work, cost a great deal more than they once did. Now is the time for all departments to be conducted with the true economic spirit required to compete successfully with more economical neighbors.

The purpose of a roller and belt shop, in any mill, is to cover all rolls satisfactorily, and to keep the belting in good order so as to transmit the power necessary. Besides these two big jobs, this department attends to all of the clearer or roll wiper work throughout the mill, and does anything else which requires special service from this department. When this department is properly conducted, it is a valuable asset to any fairly good sized mill. While very small mills cannot support a special department of this kind, many mills not now equipped with a roll and belt shop, could well afford to support such an institution.

This part of a mill, like all other departments, should be in charge of a thoroughly competent man. He should be a man who is immensely interested in this work and willing to labor hard to operate his department at a profit to the mill. This official should have charge of every belt in the mill—not necessarily to splice every small belt through his department, etc., but he should have special charge of all main and counter belts and also the larger machine belts in the mill. Especially all machine belts which are required to be cement-lapped. No old belting should be discarded, nor a new one given out excepting through his department and with his approval. He should satisfy himself that a new belt is really needed before giving one out. Through his department, it will be his duty to inspect the main and counter belts, and not allow any of them to break during working hours. He will also have the right to and should inspect all of the smaller belts, to see if they are properly cared for and correctly spliced, and if not properly cared for, to report thereon promptly to the heads of the various departments first. If his adverse reports are not acted upon promptly, he should then present his findings to the general superintendent. All belting and transmission supplies should be in his custody, and he should make out daily and weekly reports of all his activities, and account carefully for all that comes in, and for all that goes out of his department.

Economy should be his motto and rule. He should cut the leather skins and cloths in such a manner as to reduce all wastes to the minimum amount. The same careful attention should be given to roll covering cloths, and all belting and supplies. In many mills new belts are put on without stretching. The roll covering department should be equipped with a belt stretching machine. In any mill where

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a new belt is put on without being stretched first, it will be only a few hours before it must be shortened. And this process must be repeated over and over until some belts are shortened a foot or more altogether before they are of the settled length required to drive the machinery properly. What has been cut off to shorten them from time to time, may vary from one-half inch lengths and upwards, and which, of course, is useless for belting service again. But where the belting is thoroughly stretched in the belt shop before being given out for service, all of the stretched-out part remains in belting proper, instead of being wasted as useless small pieces as it must be whenever cut off at various times into small pieces to shorten or to tighten the belts. This, in itself, is quite a saving for any corporation, to say nothing of the required time for doing the work.

No belt dressings nor belt fillers should be used without the approval and the direction of the belt department. In fact only employees of the belt shop should be allowed

ROLL AND BELT SHOP REPORT

Mill No..... Week Ending.....

SUPPLIES RECEIVED

Kind of Supplies	No. of Parts	Weight	Yards	Length	Width	Size	Condition of Shipment	Shortage in Shipment	Remarks

Mill No..... Week Ending.....

WORK DONE AND COST

Name of Part	Dept	No.	Weight	Length	Width	Size	COST No. Hands	Time	Price	Cost per Part	Rem.

Mill No..... Week Ending.....

SUPPLIES GIVEN OUT

Name of Supplies	Dept	No.	Weight	Yards	Length	Width	Size	Name of Messenger

Mill No..... Week Ending.....

STOCK ON HAND

Name of Stock	On Hand Last Wk	Rec. This Week	Made This Week	Given Out	Bal. On Hand	Stock Getting Low

to apply any of these goods and then only when absolutely necessary. The value of any of these belt driving assistants is in the skillful use of them. Promiscuous use of them is more likely to do injury than good.

Referring to the covering of rolls! A great many rolls are usually sent to be recovered which are still serviceable. In the roll shop every roll should be carefully inspected before covering. In fact it is much better to have the roll shop inspector inspect the rolls before they leave the various departments for the roll shop. This prevents useless work and also prevents any possible injury to the rolls in transit, and which may not need recovering when sent out. This inspection, when properly conducted, will save any mill a nice sum of money per annum. Only the best of material, and the most skillful workmanship should be the rule in the belt and roll shop. All old belting should be returned to the belt shop. When old belting is finally discarded as of no further use for power transmission, this same department can make lug straps, bumpers, and other strappings for the weave shop and other departments of the plant. All new strapping for the weave shop should also come from the belt shop. No material should be given to any one in the mill without a properly vouched-for requisition. And a correct account should be kept of all goods given out. The person appearing to have the requisition filled should be required to sign for the goods he has received. The roll and belt shop should also sign for all that it receives of anything.

All belting should be received and accounted for in so many feet of length, and inches of width, also by the weight. All skins should be accounted for by the number of skins received, and also by careful weighing. All wastes of these should be rendered by weight. Leather slabs the same way. Cloth should also be weighed as well as measured by the yardage. The difference between the weight of new goods received and the weight of the waste enables the managment to know the correct percentage of loss and shrinkage.

Now, with reference to the record of operations for this department, there are four important weekly reports to make out, which are shown by forms 1, 2, 3 and 4. Form 1 is a weekly acknowledgement of goods received. To make it easier for this department these forms are furnished to the department already printed. All that is necessary to do is to fill in the blank spaces with the name of the supplies received, amount of the parts, and the weight, yards and dimensions as the case may be.

Form 2 is to show the work done and the actual cost of the work. Spaces are provided to show the name of the parts made or worked upon, for what department, the amount of parts made, the weight and dimensions as may be. Space is open to show the number of hands employed on the work, also the amount of time spent. This is followed by spaces for the price for the job, whether by the hour or by the piece and the cost per part, also the total cost.

Form 3 is to show what becomes of the goods made, what was repaired, and for what department. Parts given out, weight or dimensions, and the signature of the messenger who received the supplies. If the work is done in the mill somewhere, such as repairing a belt, the departmental head should sign and vouch for the work done. If it is a main belt which does not come under the manufacturing head of a department, then the local superintendent or the master mechanic should vouch for the transaction. The plan is, to have all of the work properly vouched for, and have everything conducted in a business-like manner. In this way, and at all times, the operations of this department remains an open book, and the expenses of the work can be reasonably and accurately computed. This enables the management to know what the money is to be paid out for, as well as of what becomes of the supplies, also the cost of each item of the work done.

The fourth form shown provides a running stock account of the department as follows:—name of parts, stock on hand the previous week, what was received this week, what was made during the week, supplies given out and then the balance of stock on hand.

The last column is a "Getting too low" column or an alarm signal, and the names of the goods wanted can be inserted. In this way there is no danger of this very im-

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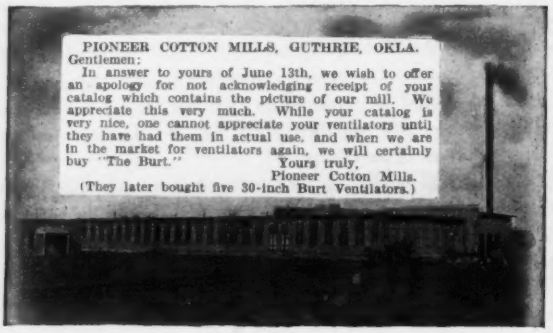
PIONEER COTTON MILLS, GUTHRIE, OKLA.
Gentlemen:
In answer to yours of June 13th, we wish to offer an apology for not acknowledging receipt of your catalog which contains the picture of our mill. We appreciate this very much. While your catalog is very nice, one cannot appreciate your ventilators until they have had them in actual use, and when we are in the market for ventilators again, we will certainly buy "The Burt."
Yours truly,
Pioneer Cotton Mills.
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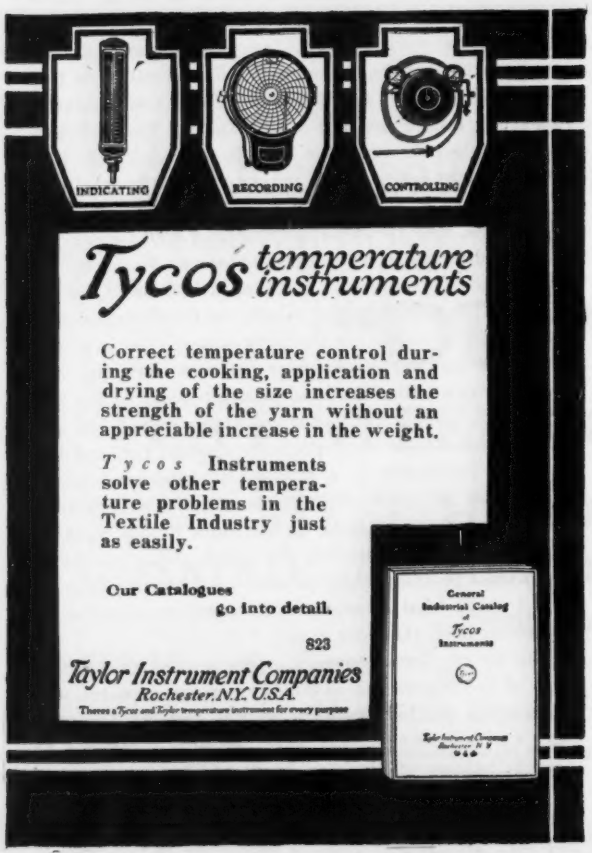
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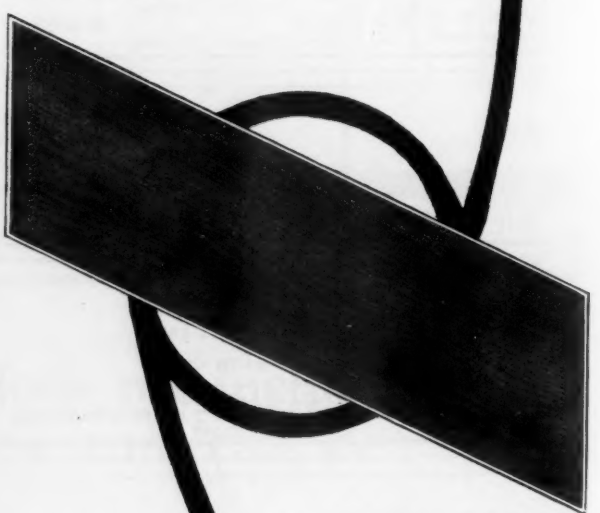

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portant department getting short of working material, and supplies.

A roll and belt department conducted in this way will pay any fairly good sized plant and prove itself to be a valuable asset. H. D. Martin. (R. I.)

Wanted—An Inventor.

EDITOR COTTON:

Years ago I made the following statement, "If the reader has the opportunity to make any test on a fly frame, let him stop the frame, and then lift a bobbin gear slightly and turn it about one-half turn towards the presser finger, or, in other words, turn the bobbin gear so as to cause a certain amount of slack on the end in question. Next, start the frame again and watch and see how this slack is taken up immediately."

This statement appeared in the columns of COTTON in 1913, and no one as yet has attemped to clarify this evil, with the exception of "R. W. A. (Ala.)," whose remarks appeared in the May, 1917, issue of COTTON. In his letter "R. W. A." says, "Meanwhile, the strand is wound on the bobbin in a very loose and incompact form."

In my article entitled "Lowering Speeds to Increase Production," which appeared in the July, 1921, issue, I asked the question, "But is it not a fact that a high speed will make a more compact bobbin, which means a slack tension, and is it not also a fact that the firmer grip at the termination of the presser pad, due to high speed, will retain the twist in the strand?"

If the reader is interested in fly frames, I wish he would keep the foregoing in mind.

Another statement that I made in the columns of COTTON years ago, and one that remains unchallenged, is, "the fly frame is the most imperfect machine in a cotton mill." Now, what makes the fly frame so imperfect? It is the pressure of the presser upon the roving. Let us quote a part of Newton's "Laws of Motion:" "Every body continues in its state of rest, or of uniform motion in a straight line, except insofar as it is compelled by force to change that state." Continuing, he says, "When a body, originally at rest, begins to move, we conclude that force is acting upon it."

All this can be applied to the functions of the presser rod on a flyer, from the beginning to the ending of the set.

As I have often stated, I receive many letters from mill men, and also from the builders of fly frames, and this has made it possible to obtain the tests on fly frames that I shall now explain.

These tests were run for ten days. The staple was 1-inch to 1 1/16-inch Middling cotton. The drawing sliver was taken at random without special preparation and placed back of two slubbers of 60 spindles each, size 12 x 6; front roll speed, 150 r.p.m.; spindle speed, 560 r.p.m.; making .67 hank roving.

One slubber was equipped with Dunn flyers and the other with Bodden flyers. All conditions were as near alike as possible and both slubbers were run by one person.

The first full doff that was run each morning for seven mornings was taken for the tests. Ten bobbins of each were taken at random from the 60 doffed from each frame for sizing.

After sizing, 56 bobbins were set into the intermediate frames, 10 x 5, making 2.00 hank; front roll speed, 109 r.p.m.; spindle speed, 860 r.p.m. One frame was equipped with Dunn and one with Bodden flyers, and the Dunn slubber roving was set into the Dunn intermediate and the Bodden slubber roving into the Bodden intermediate frame. Conditions here were made as near alike as possible, the same as at the slubbers, and both frames were run by one person.

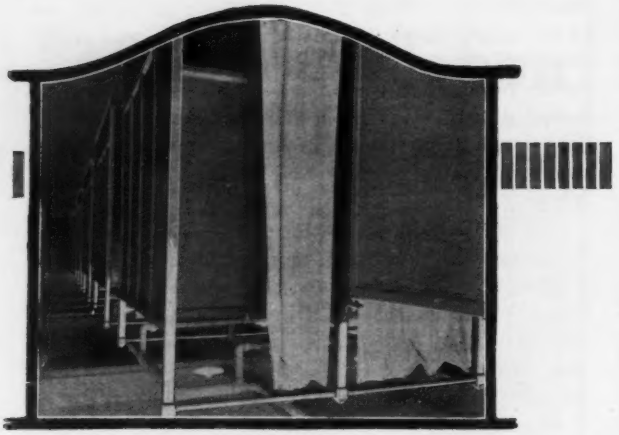
The 28 intermediate bobbins that were made from the 56 slubber bobbins were taken at the doff, for the next process. Ten out of each 28 were taken at random for sizing. These 28 bobbins from the intermediate frames were in turn set into fine frames, 7 x 3½, making 6.90 hank roving; the speed of these frames was 87 r.p.m. on the front roll with the Dunn flyers, and 83 r.p.m. on the front roll with the Bodden; speed of spindles, 1212 r.p.m. on Dunn, and 1225 r.p.m. on the Bodden frame.

The Dunn frame was running with one tooth less twist than the Bodden frame, but the Dunn roving had the same apparent twist as the Bodden.

Now, if the reader will look up the March, 1921, issue of COTTON, he will find, on page 367, where "Contributor No. 19" says, "What has puzzled and still puzzles us is how 'Wash' is able to run as little twist per inch in his 6.00 hank roving, with the stock he was running (1 1/16-inch cotton)." In the next paragraph of his letter he continues, "The other points mentioned by 'Wash,' such as setting rolls, etc., are all quite important and are something that we are working on all the time."

I present the foregoing test to prove that a man will get more out of a fly frame when he understands the relationship between cones and flyers. Please note that, in the test outlined, a tooth less twist was possible only on the fine frame. Why? Because a heavy strand will resist the pressure of the presser pad and let twist escape. I want to take this opportunity to state here, that I am not in favor of any make of flyer that increases the pressure of the presser pad on the bobbin as, in the case of the bobbin-lead frame, it will retain much more of the twist per inch, but will increase the unequal conditions, and it is the unequal conditions on the bobbin-lead frame that stretches the roving.

Let me quote a friend of mine who was at one time superintendent of one of the largest fly frame building shops, who says, "A great deal has been written upon the subject of cone drums and the peculiarity in the construction of them, which at once arrests the attention of even the most superficial observer. We mean the fact that the cones are not of a straight, uniform taper, that is, they are not right cones, but the top or driving cone is hollow or concave in its length, while the bottom or driven cone is convex in outline. Long articles have been written upon the explanations of the theory of this, but we have yet to find that the authors have ever taken into account the pressure of the presser upon the roving. They all assume, and say, but not quite in the same words, that the amount of roving given out being constant, it is necessary to vary the speed of the bobbin in proportion to the increase of diameter to prevent stretching. That the cone belt is to move one inch on one cone for each one-eighth increase in diameter of bobbin. This is quite right as far as it goes, but they leave us to assume that the diameter of the



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strand as it is laid upon the bobbin is of a less diameter or occupies less space at the beginning than it does at the finish of a bobbin. This increase is very gradual, but constant and is caused by the pressure of the presser condensing the strand. This pressure is greatest when the bobbin is empty or small, and lightest at the finish or full set. Other conditions to be considered are the speed of the spindle, slipping of the cone belt and the hank roving being spun."

The remarks just quoted were made by an expert on fly frames. Now, with the foregoing in mind, the following facts prove that excess speed or excessive weight on the presser rod will increase unequal conditions. If a bobbin increases in diameter from one-inch to 1⅛ inches, the proportionate increase is 1/9th part of the total but if a bobbin increases from 3⅞ inches to 4 inches, the proportionate increase is only 1/32 part of the total diameter.

It must be clearly seen that the equal increase of 1⅛ of an inch in the diameter of the bobbin is only equal in addition, and is very unequal in proportion. It is this inequality in proportion, resulting from equal increments of bobbin diameter, that has to be produced in the outlines of the cones in order to obtain correct winding on, and the result is the concavity and convexity of the cones for a certain make of flyer, and a straight outline bottom cone for another make.

This goes to show the influence the pressure of the paddle has in the true formation of cones.

In summing up what I have already stated, we can arrive only at the following formula: When the frame is up to speed for which the cones were modified, the tension is all between the presser pad and surface of the bobbin. Again, as the bobbin leads the flyer, the strand must be pulled past the presser finger and owing to the existing pressure at this point, the resistance and friction is great, and the greater the resistance, the more compact the bobbin.

When the speed of the frame is slackened and the pressure of the paddles decreased, this pressure and friction is destroyed, and the pull then becomes between the surface of the bobbin and front rolls. When the cone belt is at the starting point of a set, it is on the large end of the top cone, and on the small end of the bottom cone, and if the driving belt is shifted on the tight pulley too suddenly, the ends will surely slacken; that is why the layers nearest the bobbin are always heavier than those at the finish of the set. In such a case, if the frame is run slowly the slack is taken up again.

When the cone belt is shifted laterally as the set fills, and the cone belt reaches the center of the cones, the ratio then begins to change, and we find the belt working to the large end of the bottom cone, and to the small end of the top cone. Now, let us picture what happens when the frame is slackened or stopped and the pressure of the paddles on the bobbins diminished. Owing to the ratio having changed, the cone belt will not slip (unless too slack) and of course, when the speed of the frame is decreased and the cone belt is called on to drive the bobbins the excess speed then becomes too great, and a certain amount of stretch takes place which, although slight, is enough to make the roving at the ending of the set lighter than at the beginning, when the stock run is shorter than the distance from the eye of the presser pad to the surface of the bobbin.

The following two factors are what puzzle most mill men. First, this change of ratio is to a certain extent what takes up the slack already pointed out. The slack is taken up faster when the set is nearly filled than at the beginning, as can be easily demonstrated. Moreover, no trouble is had with a cone belt slipping at the ending of a set, unless, as stated, it is slack at the beginning. The second factor that worries most men is, the pull and resistance between the paddles and bobbins causes the friction found between the cone belt and bottom cone.

To make this point clear, let us assume that we have a tight tension on a jack frame of 192 spindles. In such a case, we have a tension from the surface of the bobbin to the front roll, between the paddle and bobbin, and also the friction between the paddle and the bobbin. Now, if any of these factors are removed, less resistance is offered to the cone belt, and this means an increase in speed of the bobbin. Therefore, if all of these factors are removed, the bottom cone has more freedom to revolve and will surely cause a tight tension.

However, let it be understood here, that if the tension is tight and we remove the other two factors, many ends will be strained or broken.

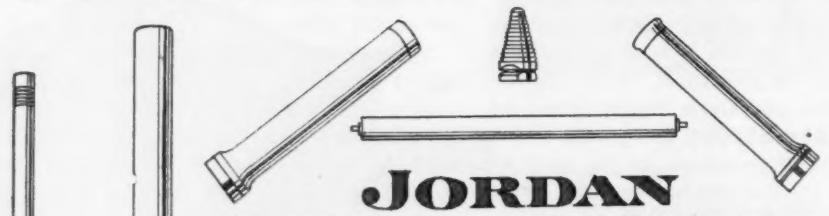
To get the possible production on a fly frame the following factors must be considered: First, when the frame is up to speed, the tension is between the paddle and bobbin. Seond, when the frame is on a low speed or stopped, the tension is between the surface of the bobbin and front rolls, a condition that should never exist on fly frames.

Let us stop here and consider the statement made by "R. W. A" regarding the strand being wound on the bobbin in a very loose form. How can this be possible when so much pressure and friction exist between the paddle and bobbin when the frame is up to speed? The only possible way to wind the roving on the bobbin in a very loose form is either to run the frame on a very low speed or have that certain bobbin smaller in diameter than the rest. Thirdly, let the reader round all the presser fingers so that the end only will rest on the surface of the bobbin. This helps to retain the twist in the strand and keeps all the bobbins of the diameter.

And fourth, he should run the frame at a speed for which the cones were modified. The latter is not easily determined for it requires a great deal of patience and study. If a frame is started and runs well until over one-half of the set and then begins to run tight, the speed is too slow, and should be increased little by little until the frame will run throughout the set without a tight tension. When changing from one hank to another, the speed of the frame should be changed.

No doubt many may even laugh at this statement, but let them remember the test at the first of this letter, which proves that a light strand will condense much more than a heavy strand, and for two reasons: first, the number of fibers in its cross-section is too great, and second, there is less twist in a heavy strand.

If these factors are mastered, the surface speed of the front roll and bobbin will be equal; that is, if the strand is uniform.



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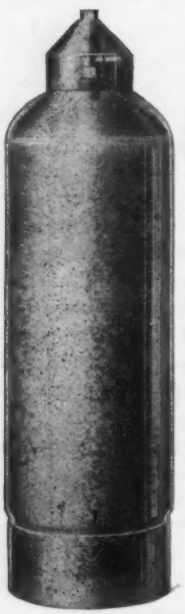

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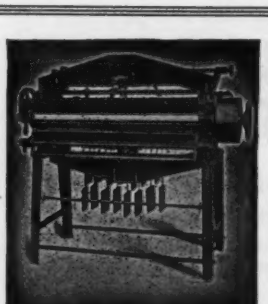

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The bobbins on the front row of flyers will stand the stretch much more than those in the back row, for two reasons: first, the distance is greater, and of course, as the strand is stretched slightly, the bobbin is slightly softer owing to being slightly lighter; and second, the twist per inch varies correspondingly to the increase in the length of the strand.

On the other hand, on the back row, the distance being shorter, the strand is not stretched as much, for two reasons, the strand being stronger aids in holding the relationship of the surface speed of the front roll and bobbin; if the strand is stronger than the increasing diameter of the bobbin, there will be an even tension and very little stretch which takes place when the frame is run slowly or stopped; and second, owing to less stretching, the bobbin is slightly harder and holds the twist, while the front row allows more twist to escape.

I think the reader will admit that the fly frame has been proven the most imperfect machine in a cotton mill. Again, I think I have shown the influence the pressure of the paddle has in the true formation of cones. I believe that much improvement is needed on all fly frames, but much more on the bobbin-lead than on the flyer-lead, and for the same reason, that is, there is too much pressure with the bobbin-lead. I would rather a thousand times be obliged to run an extra pair of frames in order to hold conditions equal.

What is badly needed is a flyer that will have the same pressure on the bobbin throughout the set. Now, here's a chance for inventors. Wash (Conn.)

Uneven Work Caused on Drawing Frames.

EDITOR COTTON:

Continuing my discussion of even and uneven running work, which began in the February number, in which I discussed the pickers and cards, I will now take up the question of drawing frames.

How quickly good picking and good carding can be spoiled and the evenness and quality of the mill's product ruined at this simple process called the drawing frame! And it is considered a simple process and for this reason a good many carders don't give it the thought it should receive. As a general rule the drawing frame is operated by someone who is not looking for promotion and who is looked upon as merely a drawing hand, and these people are put on this process just "because most anybody can run drawing; it requires less skill and training than running fly frames."

Now this does not apply to all carders, but I do know a lot of them who are this way, and I want to say here that an overseer is just as high as his ambition. An overseer that is lazy will never be successful.

In taking up specific causes of uneven work on the drawing frame, let us say, for instance, that we have six ends up on each delivery and the hand—as I have witnessed in going on a new job—takes the sliver from the can when an end runs out, stands back a piece, throws the end over and using the shifter handle in the other hand, starts the frame and lets it run several yards, still making the second, third and fourth trial to place the end. This will cause several yards—1/6th to start with—of singling. Now let's multiply the draft from this process on to the finished thread in the spinning and see how many miles of singling there will be. This is one thing that will make uneven yarn. But it doesn't stop here. The tension on the fly frame won't govern two hanks of different numbers. To illustrate, suppose on a twister, we twist a coarse thread and a fine one together. What is the result? We have what is called cork-screw yarn, and one skein or tube or cone will sometimes cause a cancellation of an order, especially when the market is off.

Another thing that will cause the same result is having the spoons on the drawing frame get so that they will not act quickly enough, allowing the end to go through the back roller; or a spoon becoming stiff from an accumulation of lint settling between the working part of the knife edges, causing them to not drop back and allowing a singling to go through or where the spoon rocks on the knife edge and drops back when an end runs out, this knife edge becomes worn from constant wiggling of the spoon.

How often should this be looked after? Well, of course an overseer can't stay around his drawing frames all the time and watch every end and see that the hand is taking out the singling. Then, why not get busy and look around and see if the knife edges need re-sharpening? It is no big job to explain to the drawing tender how important it is to take the end and replace it correctly and not just stand off and throw it at the place, hit or miss, with the frame running and making work that can't be run, much less sold. Why shouldn't the overseer take time to explain to the hand in a common sense way the results that come from such bad work?

These are just two things: To see that the end is put up right, allowing no singling to go through, and to see that the knife edges are kept filed and ground? What in the name of Jehosaphat is the use of weighing the laps in the picker room, and having the nerve to go to the office and ask them to buy a very expensive scale for the picker room so the lap weights can be held within a variation of ¼ to ½ pound, and then, by absolute neglect, let the drawing frame—that cheap fellow on the simple drawing frame—cut the weight back 1/6th? It may seem strange, but I want to say right here that a mill had just as well not have any scales in the picker room if it is allowed to go this way on the drawing.

An excessive speed of the drawing rolls, with the rolls set too close for the staple, will break the fiber, caused from the friction drafting this heavy bulk, and if the rolls are set too far apart the sliver will be drafted in lumps. The setting of the rolls and the speed of the rolls are two very important places on the drawing frame, and unless correct can be very dangerous to the quality and evenness of good running, round yarn. Drawing rolls should not run over 400 r.p.m.

The graduation or the pitch of the flutes of metallic rolls should be suited to the weight sliver to be drawn. We should never use or run the sliver so heavy that it raises the rolls up off the bosses, although I have seen cases where there weren't sufficient cards and other processes to put through the pounds required, making it necessary to do otherwise. But where this is the case, and the bulk of drawing acted on by the rolls is so heavy they are not able to rest on their bosses and will rock, the fibers will be jerked under the rolls, causing clouded sliver and uneven work. Looking at the cloth in the cloth room is a very good way to detect this evil. The cloth will have a resem-

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blance of "flake" yarns and show flat places all over it. Every carder should go to the cloth room, as often as once a week if possible, and look at a roll or two of cloth going over the inspection tables. He will be surprised if he doesn't mind.

The metallic rolls on a drawing frame should be cleaned at least once every two weeks and oiled often enough so that the roll necks do not gum. This gumming will cause uneven work. The weighting of the rolls is also a very important item. We should never use weights that are too light to properly grip the sliver, and there is such a thing as using weights too heavy and consuming extra power.

The back-lash in gears is another thing that will cause uneven yarn, on account of the frame constantly stopping and starting with a sudden jerk and breaking the sliver. The sliver can be stretched between the front and calender rolls and break the selvage of the sliver, making weak yarn.

Of course we would not notice these things as much on coarse numbers, but they are there just the same, and from 20s on up through the higher counts, they are very important. As for me, let me have a properly adjusted drawing process and trained help, with bad carding, rather than good carding and poor drawing. Bad drawing is spoiling more of the good running work and evenness than the weights or variation going on in the picker room from apron slippage and calender rack pressure in the condensation and in forming the lap on the lap pin.

Drawing rolls should be set according to the bulk of the length of the staple. The longer the cotton fibers, the wider the rolls should be spread, as is evident upon a little reasoning as to why it is that the diameter of the fly frame or spinning frame rolls, and the weights used on them to draw the sliver, are so much smaller; and it will be evident that sliver being drawn, taking also into consideration the the settings must not be so close as to make the heavy, stubborn bulk pull through in lumps.

I give herewith a good setting for drawing frame rolls, for a good grade of, say, 1-inch cotton, with a 50-grain card sliver, a 55-grain drawing sliver on the first drawing, and making a 60-grain sliver on the front. (These are for metallic rolls, when the diameter of the front roll is 1⅜ inches and the back and middle rolls are 1⅛ inches in diameter.) Back to second, 1⅝ inches from center to center; middle rolls, 1⅜ inches from center to center; and the front roll 1¼ inches from center to center.

Now on a drawing frame where the front rolls are 1¼ inches in diameter, with 1-inch second roll and back and third rolls 1⅛ inches in diameter, I would set as follows: Back to third, 1½ inches; two middle rolls, 1⅜ inches; and front and second, 1 3/16 inches.

Someone will doubtless say, "Well, why set farther apart with the larger rolls than with the smaller rolls? We are working 1-inch cotton on both of them." Yes, that's true, but here is where we must use a little reasoning, and consider why these rolls are made smaller. In the first place, the smaller rolls are more suitable in their diameter for 1-inch cotton, because they are for short stock and are adapted for light sliver, say, from 50 grains down, and the larger rolls are for heavier sliver, from 50 grains up to 70 grains. Now, if the smaller rolls were set farther than indicated from center to center, or if they were set

like the larger rolls, there would be a wider gripping surface on the stock between the rolls, because a metallic roll goes into mesh just the same as two gears. The larger the gear the more teeth there are in mesh as they lap past the centers farther. Suppose, as an example, that we had two gears with 24 teeth in each of them, and that there are four of the teeth in mesh. Then if we take two gears with 14 teeth, we will find there will be a less number of teeth in mesh. This shows that at the same distance from center to center of the two different size rolls, the larger rolls would hold the stock just a little longer, which would shorten the bite from the bite of one roll to another.

This is common sense. I have had quite a little experience in this work, and I find that many of us are prone to overlook the little things, to find out "Why is this or that thing as it is?," and I repeat, that the little things properly looked after and studied will be a great help. There is always a cause and an effect, there is a cause for every end down on a frame, and the proper remedy will prevent the cause. And there is a remedy, although at times it is difficult to find, but I do say that if one roving or end will run all day long and not come down, all the ends can be made to run that way if the proper remedy is applied. The settings given in this letter will give good results, I believe, and if they are used the drawing will be smooth and even.

J. F. L. (Ala.)

Correction.

"Contributor No. 22" advises us of a correction to be made in his letter entitled "Points on Making Belting Duck," which appeared in the April issue. The statement, "First drawing sliver, 70 grains; draft, 5.06," appearing on page 427, in the lay-out given in this letter, should have read "First drawing sliver, 70 grains; draft, 5.57."—Editor.

How to Find and Prove the Resultant Count of Twisted Yarn.

EDITOR COTTON:

I have often seen the method given below used to find the size of a strand made by twisting two yarns of different counts. Can you explain to me why this method is correct, as it undoubtedly is?

Multiply the two counts and divide this by the sum of the counts to get the resulting count. For example, when twisting one 15's with one 20's, say

$$\frac{15 \times 20}{15 + 20} = \text{Counts, or } \frac{300}{35} = 8.57\text{'s.}$$

Contributor No. 90.

EDITOR COTTON:

There is no doubt but what the method of finding the resulting count used by your correspondent is quite correct. One may easily check the answer by taking the long method of finding the weight of a yard of each yarn and then, finding the count their sum represents.

The following deduction shows how to arrive at the formula given and as shown step by step should show why it is true.

First, assume that an equal length of each yarn is used and call that length for convenience one hank, or 840 yards. Then, part of this work will be based on the following expression:

$$\frac{\text{Length in yards}}{\text{Yards per pound}} = \text{Weight (of that length) in pounds.}$$

Because the yards per pound of cotton yarn are 840 times the counts, this may be $\frac{\text{Length of yards}}{840 \times \text{counts}} = \text{Weight in pounds.}$

Now, after taking one strand each of 15's and 20's to twist together, the following facts are established:

840 yards of 20's weigh 1/20 of a pound.
840 yards of 15's weigh 1/15 of a pound.

Then, 840 yards of both weigh 1/20 + 1/15 pounds.

If 840 yards weigh 1/20 + 1/15 lbs., substitute these values in the equation to find the count,

$$\frac{840}{840 \times \text{count}} = 1/20 + 1/15$$

Then, the value 840 may be eliminated, giving

$$\frac{1}{\text{count}} = 1/20 + 1/15$$

Taking the next step to solve for the counts, the expression should be arranged to get,

$$\frac{1}{1/20 + 1/15} = \text{Count}$$

Simplifying this fraction by using the common denominator 300 gives,

$$\frac{1}{15/300 + 20/300} = \text{Count, or}$$

$$\frac{1}{\frac{15 + 20}{300}} = \text{Count,}$$

which may again be reduced and re-written as,

$$\frac{300}{15 + 20} = \text{Count}$$

Notice that this 300 is derived from 15 × 20, hence, the expression could just as well be written,

$$\frac{15 \times 20}{15 + 20} = \frac{300}{35} = 8.57\text{'s Count.}$$

This same principle may be applied to twisting three yarns of different sizes, but the form is more cumbersome and more involved. Following the same basis as in the previous case, these facts may be established, using a strand each of 5's, 10's and 20's.

840 yards of 5's weigh 1/5 of a pound.
840 yards of 10's weigh 1/10 of a pound.
840 yards of 20's weigh 1/20 of a pound.

840 yards of the group weigh 1/5 + 1/10 + 1/20 of a lb.

Then, $\frac{840}{840 \times \text{count}} = 1/5 + 1/10 + 1/20$

and $\frac{1}{\text{count}} = 1/5 + 1/10 + 1/20$

$$\text{or } \frac{1}{1/5 + 1/10 + 1/20} = \text{Count.}$$

Using the common denominator $5 \times 10 \times 20$, or 1,000, this becomes,

$$\frac{1}{200/1000 + 100/1000 + 50/1000} \text{ or}$$

$$\frac{1}{\frac{10 \times 20}{1000} \quad \frac{5 \times 20}{1000} \quad \frac{10 \times 5}{1000}} = \text{Count}$$

$$\text{or } \frac{1}{(10 \times 20) + (5 \times 20) + (10 \times 5)} = \text{Count}$$

$$\frac{1000}{1000}$$

$$\text{or } \frac{1000}{(10 \times 20) + (5 \times 20) + (10 \times 5)} = \text{Count}$$

but 1000 is $5 \times 10 \times 20$, so,

$$\frac{5 \times 10 \times 20}{(10 \times 20) + (5 \times 20) + (10 \times 5)} = \text{Count}$$

$$\text{or } \frac{1000}{350} = \text{Count, or 2.86's.}$$

Notice that each of the single yarns is multiplied by the other giving three products which are added together in place of the sum of the two single yarns of the first case.

This may be applied to more strands in a similar way, but the expressions become so involved that they are of no practical value. G. R. M. (Mass.)

Solving a Chinese Mill Problem.

EDITOR COTTON:

The writer, having been a Chinese reader of COTTON for nearly ten years, wants to "make himself at home" and join in the "How Other Men Manage" discussion without being formally invited. I have read in COTTON from time to time of various methods as to how to make better yarn at lower cost, by my American friends, and feel that I should return to them whatever I think may be beneficial and interesting to all concerned. But mind you, this is not a Chinese puzzle. It is the first piece of practical experience in a Chinese cotton mill ever told to foreigners. It is hoped that the readers will not give the writer too much "hot water" concerning the things as handled, as full power to make changes in the mill is not given to him.

Nearly all the mills in China are spinning 10s to 20s, but seldom beyond that, as most of the machinery is built for spinning such counts. Sometimes 42s are spun from American cotton. The mill to which I am now referring has 50,000 spindles. When the American cotton was at the lowest price, the mill bought about a thousand bales and used 8,000 spindles to spin 32s. The staple of cotton, when bought, was supposed to be 1⅛ inches, but in reality it was only about ⅞ inch. During the first four weeks the average production of so-called 24 hours had been about 1,200 pounds or .15 pound per spindle, and the breaking strength was about 22 pounds. Everything seemed wrong, and no one could tell why or what. The trouble did not come from drafting, but rather from the settings and speeds of the various machines, especially the latter. These were as follows: Pickers, 1,100 r.p.m.; fans, 1,100 r.p.m.; doffer, 15 r.p.m.; drawing frame front roll speed, 470 r.p.m.; slubber, 330 r.p.m.; intermediate, 400 r.p.m.; fine roving, 420 r.p.m.; spinning frame cylinder speed, 1,200 r.p.m.; spindle speed, 8,000 r.p.m., and front roll speed, 90 r.p.m. The yarn was spun from single roving. The distance between the rolls was set according to 1⅛-inch staple instead of ⅞-inch.

The mill was soon in a helpless condition, as no one could give any suggestion in regard to the result just mentioned. The yarn dealers often complained that the yarn was too weak and contained too much twist—4.75 was used as a twist factor, or 27 turns of twist per inch. Then, one day, a bundle of imported Japanese yarn was brought in for analysis and the particulars found were as follows: Breaking strength, 40 pounds; twist per inch, 18; actual size, 31.5s.

Then we realized that the yarn was to be used as filling yarn. No wonder the yarn dealers had been complaining about the twist! After making this discovery we made the following changes and got the desired result in the yarn. The speeds on the various machines were lowered as follows: Picker, 900 r.p.m.; fans, 900 r.p.m.; doffer, 13 r.p.m.; drawing frames, 300 r.p.m.; spinning front rolls, 110 r.p.m. All rolls were then set for ⅞-inch staple, and the third drawing frames were omitted.

Ever since then the daily production has been averaging over 2,000 pounds. The breaking strength, 36 pounds or more. It is clearly seen that the whole trouble came from an excessive speed on some of the machines, particularly in the pickers. Besides, the rolls of the drawing frames, which are metallic, cut the fibers more severely with the higher speed.

This little incident has saved the mill a very considerable sum in the course of a year. It is hoped that this incident will also be beneficial to some of the writer's American friends who are interested in the cotton mill business.

I shall be glad if other readers will join in this international discussion in order that we may help each other solve mutual problems. A Chinese.

The Newport Chemical Works, Inc., have introduced a new vat color, Anthrene Jade Green. This dye, which is of the anthraquinone series, is marketed as a 20 per cent paste and produces bright green shades of a bluish cast, said to be extremely fast to light, washing and chlorine. Combined with Newport Anthrene Yellow G paste, it is stated, a range of brightest greens may be obtained. This color has the distinct advantage of retaining its full green shade under the action of chloride of lime. It is also adapted to the dyeing of silk yarns. It is expected to create considerable interest among manufacturers of ginghams and shirtings, and is a significant achievement in the production of new fast colors in this country.

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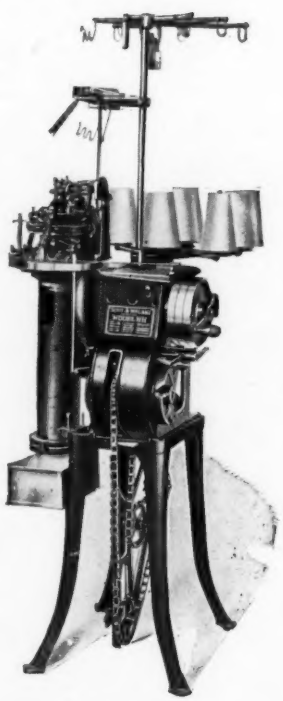

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A Pay Roll System for the Underwear Mill*

BY EDWARD H. SHIVE.

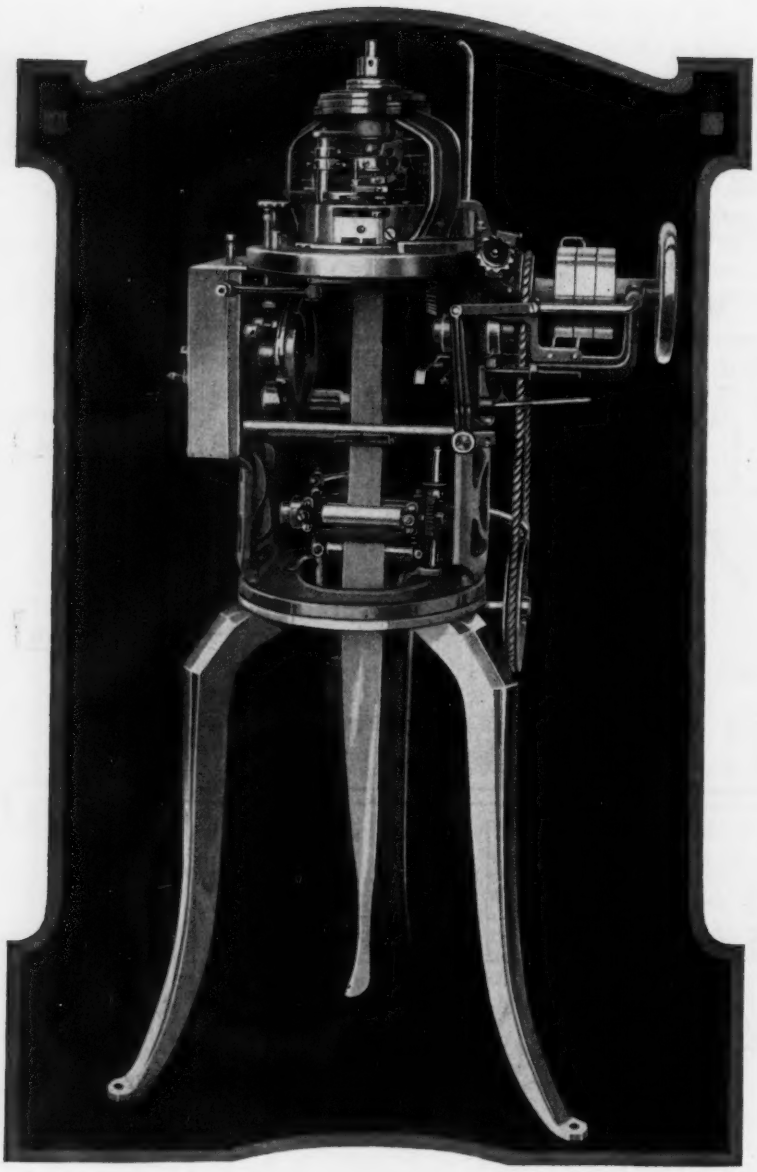
A pay roll book or sheet which is merely used to record the amount of wages paid out to the workers is a very unpractical thing to have around an office, but with my experience in more than 125 underwear knitting mill offices, I am willing to go on record as saying that fully 60 per cent of these have one of those unpractical things around, 25 per cent have a little better, and only 15 per cent have a real live pay roll system which actually gives them attendance, labor distribution with analysis, and worthwhile production information. If the reader will study carefully the accompanying forms, with the explanatory references thereto, it will be at once apparent that this type of a pay roll system is thoroughly practical and simple, and greatly to be desired over the older methods now in use for accumulating similar data and information.

FORM 1. PIECE WORK OPERATOR'S TAGS, AND SPECIMENS OF CHECKS CLIPPED FROM THE TAGS. EACH OPERATIVE CLIPS A CHECK AFTER FINISHING THE OPERATION ON A BUNDLE (ONE DOZEN) OF GARMENTS.

With the system shown here one of the tags, as in Form 1, is issued from the office to the cutting room for each dozen garments to be cut. These tags stay with their respective dozens as they go through the factory in boxes or baskets, the several operatives clipping from the tag their respective operation check as the dozens are finished by them. In Form 1, at the right, may be seen specimens of these checks thus clipped from the tags.

On Monday of each week every piece work operator is furnished with six printed envelopes, one envelope for each day of the present week. These, as will be noted from Form 2, have written at the top the name and number of the operator, the day of the week and the date. As these six envelopes are alike in every way, except for the notations on their face, but one is reproduced herewith. The operators use these envelopes for holding their clipped checks. At the end of a day the operators count up the number of checks which they have clipped for that day. (This naturally equals their production operations for the day). The operators then list their checks by operations on the envelope, showing dozens finished, the piece rate per dozen, and the amount extension. Comparatively no time is consumed, and the figures are interesting in most instances to the operators themselves as showing how much they have

*This pay roll system was prepared and installed by Edward H. Shive, formerly industrial engineer with Miller, Franklin, Basset & Co., New York, and cost system engineer for the Knit Goods Manufacturers of America, now cost and production manager for the Taunton Knitting Company, Taunton, Mass.



WILDMAN
THE WORLD'S STANDARD

Wildman Ribbing Machines

Wildman Circular Knitting Machinery has been built for a generation with three big thoughts constantly in mind; first, to make knitting machines that produce quality fabric; next, to maintain quality through years of service; lastly, to give the largest output possible with quality.

The Wildman Circular Ribber answers these requirements with the well known success of every Wildman Machine.

On request we will send the "Wildman Ribber Catalogue" giving detailed illustrations and descriptions of every important part of the machine.

TRADE MFG MARK

WILDMAN MFG. CO.
NORRISTOWN, PA.

earned. The checks are now placed in the envelope, and the envelope sealed. When passing out of the mill in the evening the operators drop their envelopes into a small box, through a slot in the box cover large enough for dropping the envelope, the box being securely locked prevents tampering or possible theft. The box is immediately sent to the office vault for safe-keeping after the mill is closed.

NAME Louise Hale NO 86

DAY Monday DATE Sept. 26

OPERATIONS	DOZENS	PIECE RATE	AMOUNT		√
Sam MCC Reg	8	32	2	56	✓
" - MDS "	5	42	2	10	✓
" - Reg CC "	1	75		75	✓
FORM 2 NO.					
TOTAL PIECE PAY			4	91	✓
INDIRECT DAY HOURS WORK AT					

DEPARTMENT HEAD—STATE BELOW REASON FOR NON-PRODUCTIVE ALLOWANCE

SIGNATURE NECESSARY IF ANY ALLOWANCE IS GIVEN

FORM 2. OPERATOR'S DAILY PRODUCTION ENVELOPE.

The first thing in the morning the pay roll clerk unlocks the box, removing the envelopes containing the checks, sorting them out, opening the envelopes and comparing the checks to the operations, dozens, piece rate, and amounts as listed on the envelopes. If an error is found, the envelope and checks are laid aside and corrected to the operator's satisfaction. The envelopes then check correctly (our experience shows only one or two envelopes a day require correction) and are entered upon the operator's weekly production report sheet, Form 3. The check marks in the right hand column on Form 2 are put on by the pay roll clerk as the amounts are checked.

The weekly production report sheets, Form 3, are special loose leaf book forms and are prepared one week in advance, showing the clock number, name of operator, and week ending date. The envelopes are entered on the proper operator's sheet, giving the operations performed, dozens finished, and rate per dozen; also wages earned for the day. Therefore, at the end of each day we have a daily wage collection. On Monday of the following week the total of dozens by operations is arrived at and multiplied by the respective piece rates gives us the total piece work wages earned. We pay $1.00 bonus to all employees working a full week of 48 hours. This is determined from the time clock card. On Monday night the piece work pay roll is accumulated on the operators weekly production report. On Tuesday morning the sheets are distributed to the proper operators for their verification and signature. The

OPERATORS WEEKLY PRODUCTIVE REPORT. 86 Louise Hale

For Week Ending October 14. 1920

PRODUCTIVE PIECE WORK

OPERATION	DOZENS Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.	Total Dozens Per Week	Pc. Rate per Doz.	Extension	Total Amount
Seaming-Mis CC Regular	8	1	11	7	16	4	45	32	14 40	
" - DS "	5			1	1		7	42	2 94	
" - Reg CC "	1	6		6		7	20	75	5 00	
" - " DS "		7	4			1	12	35	4 20	
" - Shirrs		6					6	14	84	
FORM 3 NO.										
TOTAL AMOUNT WAGE DAILY	4 91	5.11	4 97	4.16	5 54	2.74	90	Total Piece Work Amount		27 38

NON-PRODUCTIVE LABOR

DESCRIPTION	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.	Total Hours for Week	Rate per Hour	Extension	Total Amount
Hours waiting for Work										
Hours waiting for Machine Repairs										
Hours Other Indirect (State)										
Hours Teaching Learners										
Learners Expense								=		
								=		
Bonus Pay for Attendance								=	1 00	
								Total Non-Productive Amount		1 00
The above report is correct. Sign here Louise Hale							Total Hours 48	TOTAL PAY		28 38

FORM 3. OPERATOR'S WEEKLY PRODUCTION REPORT.

86
Louise Hale

Address 85 Rock St Age 19 yrs Nationality American Dept. E

Phone No. 1476 R ~~Male or~~ Female Reference Gould & Whitney Employed as Sew Mach Operator

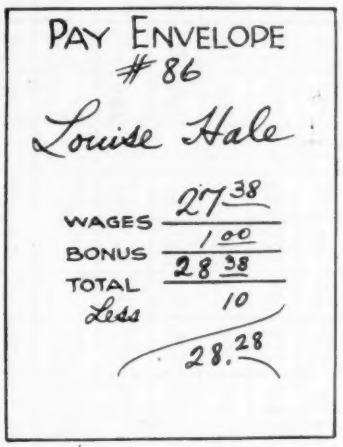
Living with Parents ~~Married or~~ Single Last Employer Gould & Whitney Piece ~~or Day Work~~

Reason for leaving—to be noted on line following last week employed. Number of Dependents None How long with last employer 3 yrs

WEEK ENDING Month	Week	Possible Working Hours	Hours Actually Worked	Hourly Rate	Gross Weekly Wage	Deduction	Net Amount Paid	PRODUCTIVE LABOR Piece Work	PRODUCTIVE LABOR Day Work	NON-PRODUCTIVE LABOR Indirect Labor General	NON-PRODUCTIVE LABOR Waiting for Work and Machine Repairs	NON-PRODUCTIVE LABOR Teaching Learners and Learners Expense	NON-PRODUCTIVE LABOR Bonus Pay for Attendance	DEPT. CHARGES Charge Dept.	DEPT. CHARGES Amount	DEPT. CHARGES Charge Dept.	DEPT. CHARGES Amount	Average Hourly Wage
Jan.	1st	39¼	39¼		21 21	10	21 11	20 21					1 00					.54
Jan.	2nd	48	48		23 44	10	23 34	22 44					1 00					.49
Jan.	3rd	48	48		23 25	10	23 25	22 35					1 00					.49½
Jan.	4th	48	48		21 84	10	21 74	20 84					1 00					.45½
Jan.	5th	48	48		21 17	10	21 07	20 17					1 00					.44
JANUARY	Total	231¼	231¼		111 01	50	110 51	106 01					5 00					.48
Feb.	1st	48	48		22 80	10	22 70	21 80					1 00					.47½
Feb.	2nd	48	48		22 42	10	22 32	21 42					1 00					.46½
Feb.	3rd	48	48		22 45	10	22 35	21 45					1 00					.46½
Feb.	4th	39¼	39¼		20 39	10	20 29	19 39					1 00					.52
Feb.	5th																	
FEBRUARY	Total	183¼	183¼		88 06	40	87 66	84 06					4 00					.48
March	1st	48	48		23 68	10	23 58	22 68					1 00					.49¼
March	2nd	48	48		24 06	10	23 96	23 06					1 00					.50
March	3rd	48	47¾		22 97	10	22 87	22 97					—					.48
March	4th	48	48		23 34	10	23 24	22 34					1 00					.48½
March	5th																	
MARCH	Total	192	191¾		92 05	40	91 65	91 05					3 00					.49¼
April	1st	48	48		19 48	10	19 38	18 48					1 00					.40½
April	2nd	48	48		22 14	10	22 04	21 14					1 00					.46
April	3rd	48	48		23 22	10	23 12	22 22					1 00					.48
April	4th	39¼	39¼		21 88	10	21 78	20 88					1 00					.56
April	5th	48	48		25 88	10	25 78	24 88					1 00					.54
APRIL	Total	231¼	231¼		112 66	50	111 16	107 66					5 00					.48½
May																		
NOV.	Total	183½	143¼		90 61	40	90 21	86 61					4 00					.63
Dec.	1st	29¼	29¼		17 96	10	17 86	16 96					1 00					.61¼
Dec.	2nd	29¼	29¼		15 63	10	15 53	15 63					—					.52½
Dec.	3rd	Sick																
Dec.	4th	"		"														
Dec.	5th	"		"														
DECEMBER	Total	59	59		33 59	20	33 39	32 59					1 00					.57
YEARLY TOTAL		2240½	2143¼		1127 69	5 00	1122 69	1083 83		86			43 00					.52½

FORM 4. THE PAY ROLL SHEET.

sheets are collected Tuesday afternoon, and, there being no errors, the wages from the sheets are entered on the pay roll sheet, Form 4. All extensions of money on Form 3, the daily as well as the weekly extensions, are inserted in red ink, although not so shown in the accompanying illustration in order to simplify the printing. These extensions being in red, makes it easier for the eye of the pay roll



FORM 5. THE PAY ENVELOPE.

clerk in checking the sheets and distinguishes money from production.

A loose leaf pay roll sheet, 13⅞ by 15 inches, is prepared for each individual operator, the pay roll sheet covering a period of one year on one side, and on the opposite side for the following year. At the top of the sheet is a permanent record of the employee which usually is kept elsewhere and not as part of a pay roll. Having this information at the top of the pay roll sheet is a decidedly advantageous feature of this system. Beginning at the left hand side of the sheet we ascertain the working hours of the mill for the week, which are the possible hours the operator could have worked, and from the time clock card we ascertain the hours the operator actually worked. Then there is a column for the hourly rate of pay if a day worker. Any change in the hourly rate can be accurately shown for the week that the change of rate went into effect. Next we show the gross wages earned, any deduction charges, and the net amount to be put in the pay envelope. The next column gives the distribution of productive labor, either piece work or day work. In the next column may be placed in minute detailed distribution the non-productive labor, which is so necessary to proper cost finding. Next comes a column for inter-department charges. This column is used when an employee is loaned from the department where regularly employed to another. The last column, probably the most important factor on the pay roll sheet, the average hourly wage paid an employee, is very useful in determining the real value of an employee; it is also needed to settle disputes regarding earning capacity with an employee, and furnishes ready information to mills in the states where minimum wage laws are in effect or are being contemplated. We also arrive at totals for a four (4) or five (5) week month period and average hourly wage for the period, finally at the end grand totals for the entire year, and the average hourly rate of wage for the year. From this pay roll sheet one clerk was able to, for income tax purposes, take off the names, addresses, and department data of all single employees earning $1,000 and all married employees earning $2,000, during the year *within two hours' time and had a pleasant task*. Form 4 shows this pay roll sheet in reduced size and with a section of the center removed to bring it within the allowable space.

The pay envelope, shown in reduced size by diagram in Form 5, is made up with figures taken from the pay roll sheet. Then by the use of a change denomination currency sheet, the currency ticket, Form 6A, is made up for delivery to the bank with the pay roll check.

Form 7 shows the government income tax report card on which are entered the gross wages paid an employee and other information taken direct from the pay roll sheet.

In an underwear mill it is very desirable to know each day the number of dozens upon which the various opera-

WEEKLY PAY ROLL
ENDING October 7th 1920

DEPT.	$10.00	5.00	2.00	1.00	.50	.25	.10	.05	.01	TOTAL AMOUNTS	RECAPITULATION		
1-3	10	5	2	3	3	4	3	5		135.05	145	$10.00	1450.00
4	8	6	6	4	5	5	7	3	16	130.76	88	5.00	440.00
5-5a	20	9	7	8	7	8	9	11	25	274.20	91	2.00	182.00
6-6a	5	2	1	2	1	1	2	2		65.05	70	1.00	70.00
7	12	7	8	6	5	8	7	8	20	182.80	69	.50	34.50
8	30	20	23	17	19	19	28	15	32	481.12	74	.25	18.50
8	43	26	28	25	21	18	35	18	46	660.86	102	.10	10.20
9	9	8	11	4	5	8	7	7	3	161.58	73	.05	3.65
10	7	5	4	1	2	2	4	3	6	106.11	148	.01	1.48
DEDUCTIONS	1		1		1	1		1		12.80			
TOTALS	145	88	91	70	69	74	102	73	148	2210.33			2210.33

FORM 6. THE CURRENCY SUMMARY SHEET.

PRODUCTION FIGURES TAKEN FROM ENVELOPES FORM No2 } DOZENS UNION SUITS FINISHED NOVEMBER 1920 4 WEEKS

OPERATIONS	1	2	3	4	5	6	WEEK TOTAL	8	9	10	11	12	13	WEEK TOTAL	15	16	17	18	19	20	WEEK TOTAL	22	23	24	25	26	27	WEEK TOTAL	GRAND TOTAL FOR MONTH
CUTTING	165	160	154	159	163	68	869	160	158	164	166	170	72	890	173	175	178	169	177	73	945	179	183	180		184	69	795	3499
CUFFING	146	144	147	150	151	67	805	151	160	149	154	158	70	842	165	163	170	169	175	74	916	175	169	176		180	73	773	3336
CROCH. FLAP	144	146	150	155	158	65	818	148	150	157	159	162	69	845	166	160	165	174	178	73	916	176	173	169		180	71	769	3348
SEAMING	172	168	166	170	168	68	912	165	170	174	168	174	70	921	179	180	174	168	175	75	951	170	176	174		177	76	773	3557
TRIMMING	147	147	152	150	155	65	816	150	149	155	158	148	69	829	168	175	174	169	167	68	921	168	166	169		173	74	750	3316
STAYING	169	166	149	158	167	66	875	159	161	158	163	169	65	875	166	167	169	167	174	67	910	173	179	177		180	72	781	3441
FACEING	169	166	149	158	167	66	875	159	161	158	163	169	65	875	166	167	169	167	174	67	910	173	175	178		177	72	775	3435
SEAM COLLAR	149	151	153	146	158	63	820	150	153	156	151	160	68	838	158	163	159	154	160	68	862	170	168	169		175	71	753	3273
FELL FLAP	153	150	158	163	167	64	855	149	150	154	150	155	66	824	160	169	168	171	174	69	911	168	167	170		178	73	756	3346
CROCH FRONT	147	146	149	154	160	65	821	154	158	153	160	169	64	858	163	154	164	159	175	67	882	165	161	167		174	72	739	3300
TACK "	162	165	159	168	167	64	885	160	159	163	156	159	67	864	167	169	163	170	174	70	913	170	175	179		183	74	781	3443
SEAM LEGS	158	149	155	163	165	62	852	157	161	165	160	168	70	881	160	168	173	165	175	73	914	168	166	175		177	72	758	3406
PATCHING	155	163	165	149	147	64	843	160	158	169	173	172	68	900	163	158	160	165	168	69	883	164	168	173		170	76	751	3377
BUTTON HOLE	140	148	154	150	158	63	813	153	155	161	160	169	73	871	160	159	156	161	165	74	875	158	160	163		160	74	715	3274
" MARK	148	145	158	156	155	65	827	155	159	163	162	169	70	878	158	160	157	159	170	72	876	159	161	165		157	70	712	3293
" SEW	152	158	161	157	163	61	852	150	163	169	171	170	72	895	160	159	154	175		72	899	158	160	168		166	69	721	3367
[illegible]ECTING	161			161	154		865	159	161			168	72	883	168	170			175	174	69								
HANGERING	154	150	148	150	153	61	816	154	150	156	160	161		905			158	163	157	164	70	872	165	163	170		179	68	745	3282
TOTAL	3107	3089	3100	3132	3196	1284	16910	3114	3159	3224	3236	3312	137[illegible]	17424	3294	3307	3323	3339	3450	1447	18130	3368	3382	3451		3510	1446	15157	67621
AVERAGE OPERATIONS	155	154	155	157	160	64	845	156	158	161	162	165	69	871	165	165	166	167	172	71	906	168	169	173		176	72	757	3379

HOLIDAY - THANKSGIVING DAY

FORM 8. MONTHLY PRODUCTION CHART ON A DAILY BASIS. THE FIGURES FOR INSPECTING, PRESSING AND FOLDING COME AT THE BREAK.

tions have been performed. With this information it is possible to speed up the production on any certain operations which are lagging behind and causing the department to become stagnated and increasing the goods in process. To determine these daily production figures by operations all we require is the data taken from the operator's daily production envelopes, Form 2. To post the figures

MEMORANDUM OF
CASH FOR PAY ROLL
FOR
Taunton Knitting Co
TAUNTON, MASS. October 7 1920

TWENTIES	-	-	
TENS	145	1450	00
FIVES	88	440	00
TWOS	91	182	00
ONES	70	70	00
HALVES	69	34	50
QUARTERS	74	18	50
DIMES	102	10	20
NICKELS	73	3	65
PENNIES	148	1	48
TOTAL		2210	33

FORM 6A. CHANGE SLIP SENT TO BANK.

on the production chart is only the work of a half hour each morning. An exact duplicate of this chart is a slate blackboard 48 inches by 60 inches, which is centrally located in the sewing machine department. The figures are copied from the chart to the blackboard which serves as information to the operators. The five operatives producing the

GOVERNMENT INCOME TAX REPORT CARD

NAME Louise Hale ADDRESS 85 Rock St.
~~MARRIED~~ OR SINGLE NUMBER OF DEPENDENTS None
EARNED YEAR 1920 $1127.69
TAUNTON KNITTING CO.
TAUNTON, MASS.

FORM 7. GOVERNMENT INCOME TAX REPORT CARD.

highest amount of dozens finished each day are given a "star" denoting satisfactory production. This stimulates quantity production. The chart is then handed to the executive in charge of production for his information, correct in every detail, because in each instance the production records tie up absolutely with money paid out on the pay roll.

Form 8 shows such a monthly production chart. In the original chart the totals are shown in red, but for convenience in printing all figures are here shown in black.

The Knitting Industry Moves Southward.

The rapid and substantial expansion of the hosiery industry in the South, as shown in the number of new enterprises, in contrast with the comparatively slight gains made in Philadelphia and Reading, Pa., is beginning to excite comment in manufacturing and distributing circles.

The South, it is commonly admitted, enjoys an advantage in the lower cost of manufacture, this being true in particular of those sections where water power is available. Philadelphia, on the other hand, is at a disadvantage due to the direct labor cost, which is attributed in great measure to union domination in the full fashioned division and the fact that with the large additions to equipment last year, when a nine months' strike led to a shortage of full fashioned hosiery, there are not enough really skilled knitters to man all of the machines.

When the union knitters returned to work last Fall after the long period of mill shut-down it was at the old wage—the post-war peak—which it was agreed was to be a subject of arbitration. With a resumption of operations a number of non-union knitters, who in the meantime had entered some of the mills as learners, were employed. These were a thorn in the side of the union knitters, and their environment was not pleasant, with the result a number of the recently trained men shifted to more congenial surroundings; others being virtually forced to give up.

During March there was such a demand for skilled knitters that employers by devious methods obtained help from other mills, one competing with another, until the pay rate was advanced in some instances by 10 to 15 cents a dozen, so that the present wage of many of the knitters is considerably above the 1920 peak. To a considerable extent the union is again in control, and to this fact may be ascribed the shifting, apparently, of the center of the hosiery manufacturing industry.

How long Philadelphia full fashioned hosiery manufacturers can continue to pay such princely wages is a question. Not long, it is felt, for there seems a certainty that with the installation of so much new equipment, production will outrun demand. A year ago not a full fashioned mill was being operated in the South. Today there is one—the Durham, at Durham, N. C.—and another is germinating. It seems a foregone conclusion that as knitters can be trained, the South will forge ahead in the manufacture of full fashioned hosiery as it has in the one-time staples and the more recent innovations, which now seem to be in the class of staples, so well have they been established.

It is but a few years ago that there were but two full fashioned mills in Reading. Now there are five, and one—the Berkshire—is doubling the capacity of the plant, with the erection of buildings to be completed and occupied this year. Last year Fort Wayne, Ind., went through the throes of a strike. Today the Fort Wayne mill is freed from unionism.

Notwithstanding the grip of the union on Philadelphia a number of full fashioned mills were established in the city last year and this, and several added machines. It is this increase that has created the extraordinary demand for help at a time when there is an estimated idle army of 4,500,000 persons in the United States. Two more mills are under construction, one for the Gotham Hosiery Co., of New York; the other for the McCallum Silk Hosiery Co.,

of Northampton, Mass., both to be operated as branches. The McCallum will install 31 leggers and nine footers, which have been contracted for with the Textile Machine Works at Reading.

The McCallum and the Gotham, like the Fort Wayne mill, sell to retailers direct, and it is assumed in the trade that in the event of an approach to an excess production this class of mills may not be affected to the extent that jobber mills will, unless some of the latter shift from jobber to retailer for an outlet. Among the direct-to-retailer mills there has not been sufficient full fashioned hosiery production, and during the period of scarcity such mills were threatened at times with a loss of a part of their trade. They were at all times in the market for the better classes of hosiery.

Philadelphia not for some time can be deprived of her supremacy as the full fashioned center, this field being better supplied than any other with skilled knitters. But, dominated by the union, few mills in the city can train help except with the permission of the union, while in Reading, the South and in Fort Wayne, raw material is being transformed into good knitters in much less time than an apprentice can become a journeyman in unionized Philadelphia.

From 1916 to 1921, North Carolina and Tennessee gained, each, approximately 100 per cent in the number of hosiery and underwear mills, Chattanooga, Tenn., in that period gaining 200 per cent. Philadelphia's growth was about 25 per cent and that of Reading was less, but many of the mills in the latter city were enlarged.

Southern hosiery mills have a materially lower dyeing cost than those in either Philadelphia or Reading. In Reading dye house labor is paid 50 cents an hour. In Georgia a manufacturer is paying 18. His cost of dyeing silk and cotton hosiery, it was disclosed at a recent comparison with the charges of a well known commercial dyer in Reading, is approximately one-half that in the Reading dyehouse. In Philadelphia labor is paid 70 cents an hour, so that the dyeing cost in this city is even greater than in Reading.

A commercial dyer says hosiery mills with large production can do their dyeing for less than they can have it done by commercial dyers, and it is noted that far more of the southern mills maintain dyeing establishments than do northern mills. The commercial dyer referred to gives this as one explanation for the lower mill prices of hosiery in the South. A Philadelphia manufacturer of silk hosiery, says he has found by experience that by farming out his dyeing he can have it done for less than he could do it in his own establishment. He is building a new mill and will not include a dyehouse. He recalls the strike of the union dyers, who, however, lost their fight last year. If there is to be another dyers' union, he says, he prefers to let the commercial master dyers deal with them.

The Carter Electric Company, Atlanta, Ga., have announced that due to certain confusion caused by the joint operation of their retail store at 63 Peachtree Street with the wholesale department at 21 Haynes Street, Atlanta, they have deemed it advisable to separate the two departments, and, effective April 1, the retail store at 63 Peachtree Street is now operating as the Capital Electric Company and will sell at retail only, while the wholesale department will continue as the Carter Electric Company.

Tariff Information Summary.

The United States Tariff Commission has recently compiled for the use of the Congress a reference book of 1600 pages entitled "Summary of Tariff Information, 1921, relative to the bill H. R. 7456" (the Fordney bill, as passed by the House of Representatives).

Neither rates nor tariff policies are discussed in this volume. The purpose of the Commission has been merely to furnish sifted data which may be of assistance to Congress in its revision of the existing tariff.

Treatment of the several thousand commodities for which information has been gathered is as follows: (1) Arrangement in parallel columns of the provisions of the Fordney bill and of the acts of 1913 and 1909 affecting the article discussed; (2) descriptive and economic data covering the uses which each commodity serves, the status of domestic production, and the volume and value of imports and exports; (3) discussion of the form of the bill, including mention of important changes in classification made by the Committee on Ways and Means and the reasons therefor, notations as to the insertion of new provisions, the elimination of obscure phrasing, and changes made to accord with existing commercial nomenclature, as well as other textual revision.

The Commission has drawn upon other departments of the Government for a considerable part of the statistics presented. Production figures were obtained from the Census Bureau, the Geological Survey, and the Department of Agriculture; imports and exports were compiled from reports of the Department of Commerce. The principal source of information, however, has been the material gathered by the Tariff Commission through extended correspondence wtih manufacturers, dealers, exporters and importers through conferences with representatives of the various industries, and at first hand in field investigations both foreign and domestic. Much of this material has already been published by the Commission in a series of tariff information surveys and in its more amplified reports, while some of it is still in the files of the Commission awaiting publication.

Copies of this publication may be procured from the Superintendent of Documents, Government Printing Office, Washington, D. C., at $1.25 per copy.

In a recently issued handbook, the Atlas Valve Company, 282 South Street, Newark, N. J., make the statement that most reducing valves, as used today, are often twice or three times too large for the purpose, and consequently needlessly expensive. They explain that simply because a pipe is a 3-inch pipe, it is common practice to order a 3-inch reducing valve while a 1½-inch or even a 1-inch reducing valve might do as well or better. They argue that since a reducing valve is virtually an "obstruction" in the steam pipe anyway, why not make the valve just large enough to accommodate the valve and seat and permit sufficient valve lift? Other information for those interested in steam flow computations is contained in this booklet, which may be had upon request.

Failure sits on the doorstep of the man who hates what he has to do.

Hypocrisy is a sort of homage that vice pays to virtue.

The Knit Goods Market

Spring started off disappointingly to primary market knit goods interests. There was not the expected rush for the Easter holiday period. In fact, in several instances jobbers rejected fancy silk hosiery received in the first week of April because delivery had not been made prior to March 31.

Spring underwear showed only a trifle more life by the middle of April. An encouraging change in dealer attitude toward the market was shown in the almost complete suspension of the self-asserted cancellation privilege, in which retailers were indulging themselves in spite of the fact they had not enough stock, generally speaking, to last them through a solid week of good trading weather. But the retailers buying from mills direct were better customers, relatively, than jobbers. The latter blamed their customers for the slow movement of goods, and the jobbers' customers blamed the consumer. As a matter of fact the consumer was the better customer of the lot.

Not only are more manufacturers going to retailers direct, but there is an increasing number selling to the consumer direct through canvassers. Three Reading, Pa., mills are selling more than their capacity output by that method. One employs a national manager on a commission basis. The national manager has subdivided a number of states by cities and the larger cities into districts, all being covered by a compact organization. With each sale the canvasser exacts payment of a small cash sum, equivalent to about his commission. The order goes to the national manager and through him to the mill, which ships the goods via parcel post, insured, C. O. D. Within an average of say ten days after putting the goods in the mail the mill has its money—no cancellations; no bad debts and, as the goods are subjected to rigid inspection, very few returns—and the national manager also has his commission. Very much hosiery, and some underwear, is being sold by manufacturers direct to consumers, and meanwhile the business of many retailers adhering to exorbitant profits is dwindling.

Several mills which have tried this method of distribution found that it was not without its obstacles and abandoned it. The expense was about the same as that of selling to retailers direct.

One claim made for direct sellers is that, as their lines carry trademarks there must be strict adherence to standards, any modifications being in the line of improvement in fabric or appearance of the branded article. Otherwise the trademark, which constitutes a salesman in itself, would lose its value and in consequence there would be a shrinkage in the volume of business so obtained.

A very large establishment selling hosiery exclusively to retailers direct was in the market in April offering a contract for full fashioned silk half hose to run a year or more, the stockings to be made to this establishment's specifications and comprise two numbers—one with silk top, the other with a top of mercerized yarn.

The popularity of the Pointex heel for ladies' stockings, the patent for which is controlled by Emery, Beers & Co., gave to the Cadet Hosiery Co. and the Radmoor Mills, both in Philadelphia, an inspiration for a similar heel. The Radmoor has given to its patent the name "Pyramid Heel." The leg of the stocking of which it is a part is fashioned, while the sole is seamless. The edges of the triangle converging at the top of the heel are straight lines; in the Cadet stocking these edges are serrated, this design also being covered by a patent. Both the Cadet and Radmoor sell to retailers.

A manufacturer who could not interest jobbers in his line of ladies' clocked seamless silk hosiery, made a contract with a catalog house, which now is taking his entire production and keeping a large part of a clocking establishment busy.

Retailers who have tried to do business without stocks of merchandise have driven more and more consumers to the catalog houses each year, just as jobbers who have not been carrying stocks have forced mills to sell to retailers direct and to some extent have left such dealers no alternative but to go to manufacturers for their needs. Consumption and consumer demand therefore cannot be measured with the distributor's yardstick.

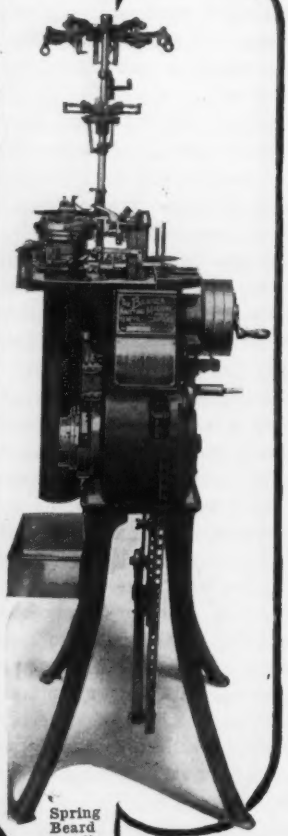
Most of the jobbers still complain that many retailers have not taken care of their fall invoices, and are refusing to ship goods to them except on a strictly cash basis. They are carrying no goods to be taken by delinquent customers at their convenience. The same story along this line comes from jobbers all over the country, and there seems little doubt that it is true in substance. But the question bobs up, "If retailers are not paying their bills to jobbers why do the direct mills solicit their business?" The answer must be left to the parties involved.

Collections from retailers have not been good this year. A large establishment selling to haberdasheries and many dry goods stores in every state in the union shows this is true. Comparisons are made by months with the average for the last five years. Of the totals of the aggregate accounts outstanding at the beginning of January only 41 per cent had been collected during the whole of the month. The five-years' average for January was 51 per cent. February should have shown collections equal to 58 per cent of the sums outstanding on the first of the month to keep pace with the average. They amounted to 48 per cent. March made even a worse showing, with 52 per cent collections, against an average of 65. The head of the credit department of this establishment is inclined to agree with the jobbers in their allegations of the delinquencies of the retailers.

An important western jobber who was in the East recently blames the jobbers themselves for the unfriendly attitude of so many retailers. "They were spoiled," he says, "when jobbers were so eager for business that they were willing to make almost any sort of concession, from which has sprung a flood of vicious practices. Jobbers coddled the retailer for a time; now the retailer just lets the jobber understand that he can get along without him. Particularly is this true as relates to hosiery and underwear," the western jobber thought, "because of the increasing number of mills catering to the broken case trade."

The outstanding feature in market improvement during April was the steadily increasing number of small orders, some of the really big jobbers buying ridiculously small lots. A southern jobber negotiated several days in New York for 60 dozens of children's hosiery. He feared his

The Banner Full Automatic Hosiery Machines



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Simplicity
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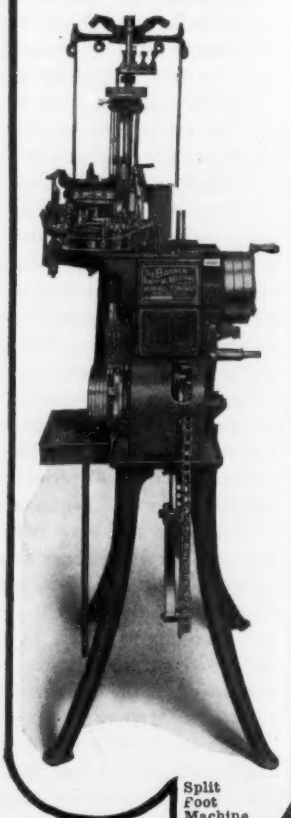
All Parts Accessible from the Front of Machine

We have just placed on the Market two new models—The Spring Beard Needle, built in sizes of 3" to 3 3-4" diameter, and a new model —Split Foot Machine, built in sizes of 3 1-4" and 3 1-2" diameter.

Write for descriptive catalog



Split Foot Machine

HEMPHILL COMPANY

MAIN OFFICE AND FACTORY PAWTUCKET RHODE ISLAND

TRADE MARK

SOUTHERN OFFICE and SHOW ROOMS 912 James Bldg. CHATTANOOGA, TENN.

PHILADELPHIA OFFICE and SHOW ROOMS 208-9-10 COLONIAL TRUST BLDG. PHILADELPHIA, PA.

house could not handle so much as a case of 120 dozens. The mill representative refused to split a case, and eventually the gentleman from Tennessee concluded to risk a case.

A jobber in Minnesota sent a Pennsylvania mill an order for one case—60 dozens—of ladies' hosiery, in three colors and four size assortments. It is easily conceivable that one day's selling would exhaust such a supply.

The prize order of this character was from a really good-size jobber establishment in Chicago, for two cases of ladies' hosiery in color assortments. The order was received on April 3rd, specifying immediate delivery; "not later than April 15," and the person who wrote the order was careful to inscribe across the face of it, "Prices to be guaranteed to date of delivery"—the guarantee extending over a period of 12 days.

Several jobbers who ordinarily would not buy less than five or ten cases of cheap light weight underwear bought from 10 to 15 dozens of ladies' vests, at $1.50 a dozen, to be sent by parcel post on day of receipt of order. It is orders of the type referred to that disclose the extent to which jobbers everywhere have been starving their stocks.

There is too much cheap hosiery immediately available for good healthy trading conditions, and supplies of heathers and wool goods generally for Fall and Winter give promise of being sufficient. It has been the fear for some time that there was danger of production of such lines being overdone. Winter numbers were bought rather heavily several months ago, and since then the market as to these has lain dormant. Manufacturers the country over are sampling yarns for arriving at what may be assumed to be the popular mixtures and color combinations, and spinners of worsteds find this about the only evidence of activity in wool hosiery. Once a mixture with wool is decided upon there remains the question of per centum of the constituent fibers. Then there is the problem as to the feasibility of stock dyeing and the determining on ingrain or cross dyeing. After all of this is out of the way and the spinner and twister are left with the physical aspects of the proposition, the manufacturer is kept guessing as to shade and color.

It is the impression in the trade and the expressed opinion of leading shoe interests that low shoes will be worn by a very large majority of womankind next Winter and that therefore the short skirt will remain and sports and fancy hosiery will be in as great demand as high colors of full fashioned silks in Summer. The outlook is for plain shades on the pastel order for sports stockings and heather mixtures adapted to the tweed suits. The Rockford Mitten and Hosiery Co., Rockford, Ill., is making ladies' hosiery of mercerized yarn and artificial silk in fourteen tweed color mixes for Spring and Summer, and may show even more shades for Winter. It is understood jobbers have taken very kindly to the line.

Most of the mills making ladies' mercerized wide rib hosiery are having about all the business they can take care of. A Philadelphia mill running strong on this number also is having a good market for ladies' plain-leg mercerized with ribbed top, and misses' mercerized of plain and roll top. The mill is being operated time and half time. A number of mills engaged on novelties are equally well situated as to business.

David Jacobs, 268 Broadway, New York, is reported making a killing with the split tape seam stocking with the fashion darts. It was brought out some time ago by a Philadelphia manufacturer, who has vested in Mr. Jacobs' exclusive licensee's rights for distribution of the stocking among jobbers. It is sold under the brand "Duo Seme." Associated with Mr. Jacobs, who is fast coming to the front as one of the more active hosiery men in New York, is Ralph T. Edwards, formerly connected with the mill organization of Garnett Andrews, of Chattanooga, Tenn., and Rossville, Ga.

The Berkshire Knitting Mills, Reading, Pa., came out on April 10 with prices for the second half of the year, being the first of the full fashioned silk hosiery mills to get into line for the next season. Although raw silk was 40 cents a pound above last year's price when the Berkshire began selling for the current season, and there has been no reduction in wages, prices remain unchanged. By the middle of May the Berkshire will have completed a revision of the allotments by which the production was parcelled out among the mill patrons on the basis of their last year's contracts. At this writing it is understood the mill has sold 90 per cent of production to December 31, for deliveries beginning in July.

Seamless silk hosiery for ladies is kept to the front by having been put in the novelty class, showing self-clocking, lace instep, etc. But for the progressiveness of manufacturers of seamless stockings in this respect their product would have little show with full fashioned at prices established by the Berkshire knitting mills, basis of 11-thread standard boot and regulation mercerized heel, toe and sole, at $13.50 a dozen. A southern mill is putting out a good plain seamless 18-inch silk boot at $7 to jobbers, in contrast with $9, the price named by some mills for 20-inch boot.

A mill in the South also is selling a line of silk half hose with an as well built foot as ever was shown, selling it to jobbers at $4.75, which in the trade is regarded too little for a sock of so much merit. But it has been found that low prices, adhered to, command more respect from buyers than reductions from prices which proved to be too high to be attractive. A number of recent cancellations of orders for fancy full fashioned silk stockings are attributed to jobbers' notion that a lower price would have given the several manufacturers a liberal margin of profit.

Prices of cheap carded hosiery for men and women were somewhat disturbed in April by the circulation of a report that a manufacturer was offering a distress lot at under the market. It is understood about 600 cases of 176 needle were disposed of among a few jobbers.

The mercerized half hose lines of a number of direct-to-retailer mills were reduced about the latter part of March, and it is stated that the reduction soon stimulated purchasing, as at the new prices the socks became a 40-cents-a-pair seller. Retailers had contended that the public would not pay 50 cents a pair for the one-time quarter stocking. Present prices of cheap hosiery command less money today than in January, and in the trade during the waning April days there was heard predictions that still further declines would be witnessed by May.

Seamless hosiery mills in Reading, Pa., in April were reported by manufacturers generally in that city as operating at an average of 40 to 50 per cent of capacity. Several mills making novelties and fancies were running full time. One large mill, which some months ago became financially involved, was shut down entirely, and another, which for several years has been having an outlet for its

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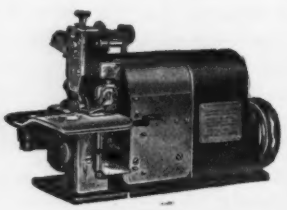

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Knit Underwear	Pants	Bed Covers
Men's and Ladies' Stockings	Petticoats	Bathing Suits
Sweaters	Hats	Table Covers
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Shirt Waists	Blankets	Wash Cloths
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ANNOUNCEMENT

We cordially invite all those interested to attend our exhibition at the Convention of the National Association of Hosiery and Underwear Manufacturers, Philadelphia, May 22nd to 26th, inclusive. Our booth is No. 313.

THE MERROW MACHINE COMPANY

Established 1838

16 LAUREL STREET, HARTFORD, CONN., U. S. A.

CATALOGUE AND SAMPLES UPON REQUEST.

entire production, reduced its working force by 25 per cent. Philadelphia seamless mills, with a very few exceptions, are working only part time or with only a part of the organization. Full fashioned mills in both Philadelphia and Reading are being operated to capacity.

The United Hosiery Mills Corporation, Chattanooga, Tenn., a few weeks ago appointed Gregory and Rutherford, 350 Broadway, New York, sole selling agents in the North. Captain Gregory, senior member of the firm, until January 1st was New York sales manager for the Durham Hosiery Mills.

The McCallum Hosiery Co., Northampton, Mass., will install forty new full fashioned knitting machines in a building which it has in course of completion in Philadelphia, and the Gotham Silk Hosiery Co., New York, is building a ten-story full fashioned mill, also in Philadelphia. Both mills sell to the retail trade.

Not in many years has the manufacturer of heavy weight underwear been beset by so much uncertainty as in this year. Mills are still engaged on initial orders, but so little new business has been written in the last eight weeks that there is much doubt as to how long operations can be continued without incurring the risk of accumulating stock of present doubtful value. One or two of the large mills selling direct to retailers are understood to have booked considerable Fall business on their leading numbers, but as a class the jobber mills have not sold above 40 per cent of what may be assumed will be the trade's requirements for the year. It is because jobbers went on the road late, and have shown no disposition to buy for retailers' anticipated needs, that the retailer mills are having the better relative volume of business.

By withholding orders that ought to have been on mill books a month and more ago jobbers are imposing a hardship on manufacturers. As it appears at this writing, some of the large mills either will have to curtail production or carry stocks for jobbers. They are manufacturing more than they can ship out within the delivery period. In order to complete deliveries in compliance with specifications they must carry hundreds of thousands of dollars in stocks for a month or two at the least, and they hardly can escape accumulating goods for which the orders are in the future. Deliveries must not be one day past due. If they are, cancellation of complete orders or rejection of a shipment is likely to be the penalty. Hence, the necessity for making up goods well in advance, that they may be gotten to destination in advance of cancellation. Cancellations recently have not been so common as requests for deferred shipments, which in themselves leave mills with heavy capital investment in goods that are the property of others under contract between buyer and seller. Many buyers have been brutally unconcerned as to sellers' ability to carry the goods.

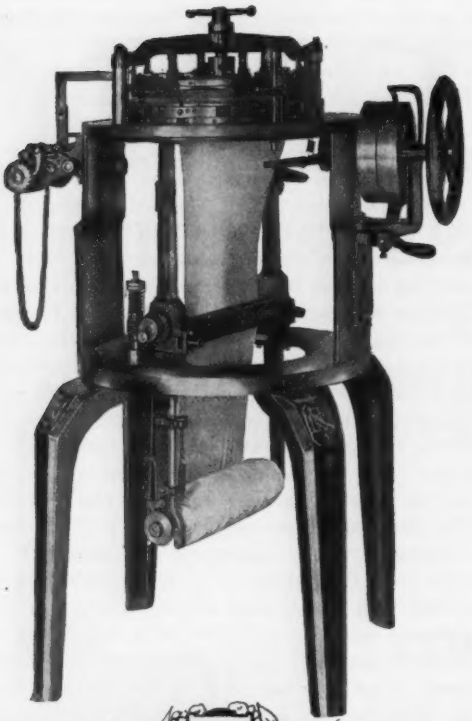
Jobbers are not wholly to be blamed for refusing to obligate themselves for normal deliveries of Winter underwear, which eats into capital very fast. There is one class of retailers—those who are not paying their bills, many of them indebted for last Fall's invoices—from whom jobbers are soliciting no business. There is another class that is determined to buy no underwear until possibly a few weeks before the consuming public will be calling for it. Ordinarily stocked up well before Fall, this year they are refusing to carry stocks for themselves for even a month or two. They would be willing to order now and take the goods in four to five months hence. Retailers have been imposing on jobbers for several years, partly because the latter were too lenient. There always is the fear of losing an old customer that impels a jobber to let the retailer have goods on his own terms. Now the jobbers are being abused because they permitted abuses to creep in.

Jobbers in the main suffered heavy losses in the last two years. They may suffer losses this year, also, but they will not be so heavy from bad debts as from doing a small volume of business on a large overhead cost. They are carrying no stock for either the delinquent customer or the customer who refuses to carry a little of it for himself. Hence the burden falls on the manufacturer, who always is "made the goat," carrying goods for a questionable trade, selling at replacement in a declining market and yielding to the customer the gains in a rising market. Manufacturers are in this plight because they are turning off more underwear than the consuming public can absorb, at any rate in the present economic condition and therefore in possibly the keenest competition they ever experienced, and confronted with a competition still more keen.

Aside from the attitude of retailers, jobbers have had to contend with that element of society which is paid to order men to quit their jobs when mills must either reduce cost of manufacture or quit producing until the public can be forced to pay the high cost against which it went on strike. Both the New England textile strike, which to the middle of April had cost every man and woman who engaged in it an average of $250, and the coal strike were anticipated in the field of commerce, and buying had been restricted for some time before they were inaugurated. It is doubted whether distributors had not carried conservatism to the extreme in advance of the strikes. The effect of the strike was not to cause less distribution, but to prolong the period of its shrunken volume. Winter underwear, along with sweaters, were harder hit by the strike than was hosiery. There seems no question that about the usual number of dozens sold in a season will be put into distribution this year if jobbers can get the goods late in the season. Whether they can will depend on the extent to which manufacturers will carry stocks for them.

Jobbers themselves admit that if late buying causes any material pressure on mills—if goods be not in supply for deliveries when wanted—manufacturers will make them pay the penalty for their waiting. No one doubts there will be enough underwear to go around, but the difficulty will lie in getting what is wanted when it is wanted, and it is a foregone conclusion that if there develop a keen demand, manufacturers, who are not in business as philanthropists, will pursue the customary course in business—get out of an emergency all that there is in it. Jobbers say they would rather pay higher prices a month or two hence than buy now at low prices. Some are reported unloading, at a very slight margin, much of the heavy weight cotton ribbed underwear which they bought last year at concessions and took in this year in January to March 1st. They had overestimated the value of the retailer as a factor in distribution.

Buyers still regard the light underwear market as in their favor. Some manufacturers, notably the Pennsylvania group, have or are believed to have stocks. With some of the mills accumulations are unnecessarily large, but through April there was no significant offering of goods at concessions for getting rid of burdensome stocks.



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We claim for our machines simplicity, correct principles of construction, durability and excellence of workmanship.

Reputation—with half a century's time back of it.

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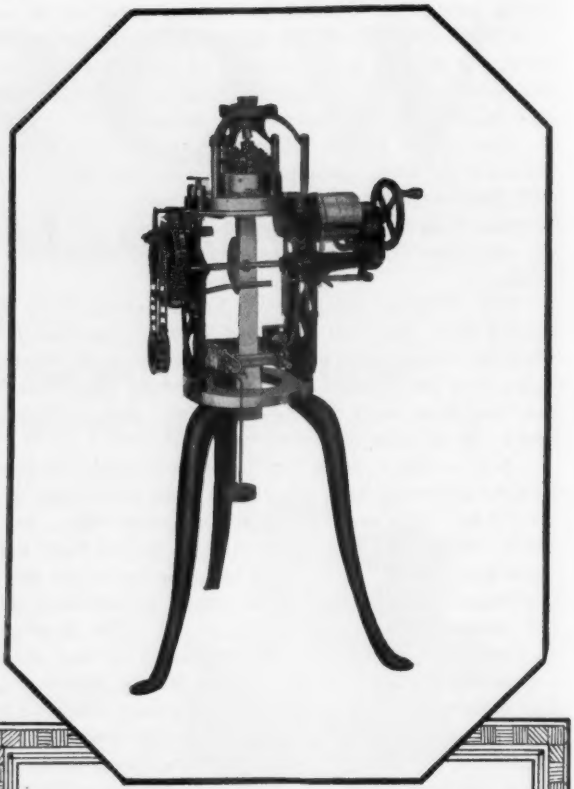

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possess all modern improvements, including selvage welt, French welt, double knee, dogless and striping attachments, with automatic stop motions.

Built in all sizes, for all classes of rib work.

We also build hosiery knitters and Body machines for underwear and various other circular machines for all kinds of knitted articles.

Samples and prices on request.

H. BRINTON COMPANY
Philadelphia Pennsylvania

Manufacturers realized that if they undertook to force the market they would weaken their position, and that, on the other hand, if they waited a few weeks longer the pressure would be from buyers and that prices better than present offers would be obtainable.

The middle of April found a jobber here and there in the class of small retailers. Orders which should have been for cases were for a few dozens, to come forward immediately by parcel post.

The opinion was expressed by the buyer for an important western jobbing house that jobbers are forcing manufacturers to sell to retailers direct. "While they ought to be buying for approximately 50 per cent of needs as measured by the smallest year's volume of business in their experience, they are buying nothing or only enough to last them a few days. Mills cannot be operated economically on such a scale of distribution, and not a few retailers not finding immediately deliverable goods among jobbers, have gone to mills. So that not only are more retailers buying direct, as a consequence of jobber conservatism carried to the absurd, but also some prices are unnecessarily high because a high cost operation is forced on mills. I am told," this jobbing house buyer continued, "that the Munsingwear Corporation, which sells to retailers only, has been having an enormous business in most of its numbers, while mills distributing through jobbers have barely enough business to keep them going half-time."

An incident which indicates the condition of stocks of even light weight underwear in retail stores occurred in a Pennsylvania town where are located two or three mills selling to jobbers. During high temperatures on three successive days in April every retailer in the town, of about 4,000 population, made a raid on the several mills for from five to ten dozens of ladies' vests and union suits. There seems no doubt that retailers the country over are operating equally close to the bottoms of their stock bins, and that very soon, with seasonable weather a settled fact, there must develop an acute demand for light weight underwear. A like situation as to heavy weights should be witnessed with the approach to Fall.

Among the Knitting Mills

The industrial democracy plan has been instituted at the Troy and Cohoes (N. Y.) plants of the Wright's Underwear Company, Inc. The matter was presented to the entire working force of these mills in a recent mass meeting, and 87½ per cent of the employees voted for the adoption of this system as a medium for all negotiations in the future between the employers and employees of the company. Previous to this decision, the principles and workings of the plan were fully explained to the employees by John Leitch, who is the originator of industrial democracy. Mr. Leitch will for several months continue to instruct and guide not only the employees, but the executives of the company as well, in the installation and proper workings of this system.

A charter amendment authorizing the Paul Knitting Mills, Inc., Pulaski, Virginia, to increase its capital stock from $100,000 to $400,000, has been granted. The officers of the corporation are A. T. Eskridge, vice-president, and A. V. Victorious, secretary.

Efforts are being made to push to rapid completion the new spinning mill that is being constructed by the Durham Hosiery Mills at Mebane, N. C. It is understood a portion of the machinery has been installed. This plant will manufacture knitting yarns for use in the hosiery mills of the company.

Considerable interest is being manifested in the proposed construction of a knitting mill at Andalusia, Ala. A committee of the Chamber of Commerce, headed by Allen Crenshaw, is offering stock in the project, the plan being to capitalize the company in Andalusia and Covington County.

The Acorn Hosiery Mill, of Reading, Pa., is planning the erection of a new three-story and basement mill, 66x90 feet, at Mahanoy City, Pa.

The Kathan Hosiery Co., Gloversville, N. Y., has been formed to manufacture hosiery and other knit goods, A. J. Wilson will be associated with the company as manager.

C. M. Peeler, Southmont, N. C., is considering the establishment of a hosiery mill at that place, according to a report.

Herman S. Voss, of New Britain, Conn., and associates, will erect a new hosiery mill at Lansdale, Pa.

S. M. Schwenck, Perkasie, Pa., is planning the construction of a two-story knitting mill, 50x100 feet, estimated to cost about $37,000, including equipment.

Construction work on a new mill has been begun by the Elita Knitting Mills, Royersford, Pa. The mill will be three-story, 40x82 feet, and will be located at Pottstown, Pa.

L. S. Baker, North Carver, Mass., plans to build a knitting mill, and a dye house will also be erected.

The Pitman Manufacturing Co., of Laconia, N. H., hosiery manufacturers, will spend about $50,000 in plant improvements including a new three-story building about 65x100 feet in size, of brick and steel, providing space for a new dye house and for additional manufacturing capacity. Charles J. Pitman is treasurer, and the improvements will be designed and supervised by Lockwood, Greene & Co., engineers, of Boston.

The Fashion Knitwear Mills, Inc., recently organized at Peoria, Ill., has leased space and plans the immediate establishment of a knitting plant.

The Avon Knitting Co., Inc., Avon, N. Y., will build a plant for a knitting mill. The company is incorporated for $60,000 by C. H. Holcomb, of Henrietta, N. Y., and W. A. Wheeler and C. T. Davin, of Avon.

The equipment of the new hosiery plant recently established at Hendersonville, N. C., by Harkins, Hammack, Wheelock, Inc., consists of five latch and fifteen spring needle knitting machines, three loopers and one ribber. B. M. Oates is president and G. S. Wheelock is secretary and manager. The capital is $15,000.

Application has been made for a charter of incorporation as Richard Schletter Co., Inc., by Oscar Nebel, Richard Schettler and J. K. Voehringer, for the purpose of manufacturing knit goods. The plant will be located at Kensington Avenue and M Street, Philadelphia.

R. A. Reiff, 620 Hanover St., Pottstown, Pa., will erect a new one-story knitting mill, 50x100 feet.

The Goodman Hosiery Mills, Indianapolis, Ind., will

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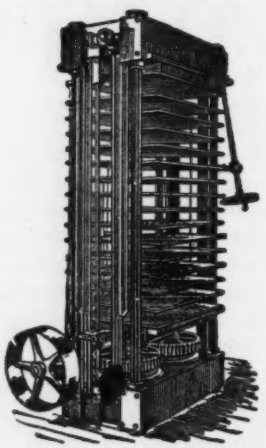

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Circular Rib Knitting Machinery
Cylinders and Dials

construct its new knitting mill in Indianapolis instead of at Fort Wayne, as formerly contemplated. It will be two-story, 100x200 feet. Lockwood, Greene & Co., Chicago office, are the engineers.

Weiss Hosiery Mill, Cleveland, Tenn., has increased capital from $25,000 to $45,000.

E. A. Lee, Pikesville, Tenn., is reported interested in establishing a hosiery mill.

Plans for a new addition are being made by the Girardville (Pa.) Knitting Mills.

The Davenport Hosiery Mills, Chattanooga, Tenn., are planning for the installation of new hosiery machinery and auxiliary equipment.

Plans for doubling the capacity of the Texas Hosiery Mills, Dallas, Texas, are being considered, it is announced by James C. Dobson, president and general manager.

The B. Smolin Co., New York, N. Y., has been incorporated with a capital of $25,000, to manufacture cotton hosiery and underwear products. The incorporators are B. and R. Smolin and S. R. Gerstein, 299 Broadway, New York.

P. J. Rassler and E. Gibay have organized the Awone Knittings, Inc., Brooklyn, N. Y., to manufacture knit goods specialties. The company will operate with a capital of $10,000.

The Artistic Knitting Mills, Inc., Auburn, Pa., will place construction work under way at once on its new local knitting mill. William D. Hill, Ulmer Building, Pottsville, Pa., is architect.

The Westerly Textile Co., Westerly, R. I., will break ground at once for the construction of a new five-story mill, 32x50 feet, to cost about $50,000.

The Aurora Knitting Mills, Pottstown, Pa., has acquired a local building, 87½x140 feet, three-story, for a consideration of $50,000. The company will convert the structure into a knitting mill, to be operated in conjunction with its present plant.

The French Knitting Mills, Brooklyn, N. Y., have been incorporated with a capital of $10,000, to manufacture knit goods products. The incorporators are S. Ullman, W. and L. Foumberg and M. Wolfman, 60 Graham Avenue, Brooklyn.

The Seneca Knitting Mills, Pottstown, Pa., have been incorporated with a capital of $40,000, to manufacture knit goods products. G. Brooks Thomas, Spring City, Pa., heads the company.

The Everknit Hosiery Mills, Bay City, Mich., have filed notice of increase in capital from $40,000 to $125,000, for proposed expansion.

John E. Dakin has organized John Dakin, Inc., Milton, Pa., to manufacture cotton underwear products, hosiery, etc.

The Wilkinson Knitting Mill, Tunkhannock, Pa., is planning for the early occupancy of its new plant addition, and will increase the working force, in the near future.

Latch Needle Circular Ribbers

BY G. R. MERRILL.

A latch needle circular ribber is a machine using two sets of latch needles at right angles to each other. One set of these needles is placed vertically in a cylinder and the other set is placed horizontally in a dial on radial lines of a circle, above, but concentric with, that in which the cylinder needles stand.

The principle of the circular ribber is the same as that of the flat ribber. The horizontal needles draw loops in one direction, or to the inside of the tube under construction, and the vertical needles draw loops to the other or outer side. There is a type of ribber in which this arrangement is reversed, so that the dial needles form the outside of the tube and the cylinder needles form the inside. As would naturally be supposed, this similarity of principle makes it possible to produce much the same range of stitches on circular ribbers as on the ordinary flat machine.

The plain stitch, in a tubular form, may be produced by knitting on one set of needles. Usually the cylinder needles are used for producing a plain stitch fabric because of mechanical difficulties encountered when using the dial needles for this purpose.

The plain rib stitch is produced, in a tube, by using both sets of needles.

A half cardigan stitch is made with this same arrangement of needles and a change of the cams controlling the dial needles at the completion of each revolution. By using a pattern controlling device, the dial needles may thus be made to knit for one revolution and tuck for the next, thus building the half cardigan stitch.

A full cardigan stitch is made with the same needle arrangement as for the rib stitch, by tucking on each set of needles alternately. The dial needles are caused to tuck, as when making the half cardigan stitch. The cylinder needles, by a special cam arrangement and a pattern controlling device, may be made to tuck during the revolution when the dial needles are knitting.

Fancy effects may be produced by using these stitches in combination, or by arranging the needles to give fancy ribs, as is done on flat machines. Again, by using several "feeds," or yarn guides and knitting at more than one point around the cylinder and dial, and by yarn changing devices, patterns in color and stitch may be made of an almost endless variety.

Circular ribbers are made with very small and very large diameters. Small ribbers have a needle circle of less than one inch, while the large ribbers often have diameters as great as thirty-six inches.

The cloth made on these machines has a great variety of uses. Some of the common uses of the fabrics from large ribbers are listed here: Coatings, suitings, dress goods, jerseys and underwear. Common uses for fabrics from small ribbers are: Stocking legs (children's hose); cuffs (men's half hose); tops (women's hose); cuffs for underwear; neckties, skating caps and bandages for horses.

Circular ribbers can be divided into two general classes, known as revolving cylinder and stationary cylinder machines. Since the cylinder carries one set of needles, the needles revolve or are stationary just as the cylinder is. Because the two sets of needles sort of interlock or mesh when knitting, if one set moves the other must. So, if

the cylinder revolves, the needles revolve and of necessity the cloth, which is carried by the needles, also revolves. Finally, the take-up device, for collecting the finished cloth, must revolve, if the cloth does, to prevent having the cloth twisted into a sort of rope. On the other hand, if the cylinder is stationary, all of these other parts are also stationary.

The following table shows the parts and whether they move or are stationary in the two types:

Type	Revolving Parts.	Stationary Parts.
Stationary Cylinder	Cams (cyl. and dial) Yarn Guides Yarn Pkg. (usually)	Cylinder (& needles) Dial (and needles)
Revolving Cylinder	Cylinder (& needles) Dial (and needles) Take-up	Cams (cyl. and dial) Yarn Guides Yarn Package

The discussion which is to follow will treat of a small, single feed, stationary cylinder, circular ribber. In the small sizes, the stationary cylinder machine is more common than the revolving cylinder type.

Figure 1 shows a section of a circular ribber taken vertically through the center of the cylinder. Above this section of the cylinder is shown the dial and some of its accessories.

The hollow cylinder is beveled off on the inside upper edge, leaving only a thin wall back of the needle slots. Around the lower portion of the cylinder are the cams controlling the cylinder needles. These cams (in this particular case) revolve about the cylinder which is stationary. On the inside wall of the cylinder a small metal block is fastened, one end of which projects out into the open space enclosed by the cylinder.

The dial is shown lifted considerably above its normal position to make the diagram less confusing. The dial is a round, metal plate with slots cut in the upper side, along radial lines. The under side is beveled off so that there is only a thin wall under the outer end of the needle slots.

There is a spindle which runs through the center of the dial and is its support. The washer shown in the diagram is fastened by set screws to this spindle and prevents the dial from dropping off. On the under side of the dial, there is a cylindrical projection which surrounds this spindle and extends down to the washer. This is hidden and is not indicated on the diagram.

The butterfly (so termed because of its similarity to a butterfly nut) is a small hollow cylinder with two flat projections, opposite each other. A slot is cut through the cylinder in one position making it possible by means of a screw to clamp the butterfly to a cylinder a little smaller than the diameter of its hole. This is what is done, for the butterfly is fitted to the lower side of the dial before the spindle is put through.

The projections or wings of this butterfly are of such length that they do not strike the wall of the cylinder when the dial is in place, but will strike the stop set in this wall. This is what prevents the dial from turning.

The dial cap, which is a metal disk about the same diameter as the dial, holds the dial cams. The dial cams are so placed that they do not rub against the dial but do come quite close to it. The dial cap is fastened by set screws to the spindle which runs loosely through the dial. The upper end of this spindle is fastened to a yoke which turns with the cylinder cams. This connection is indicated by the dash lines.

Thus, when the cylinder cams turn, the spindle turns carrying with it the dial cams. The dial will also turn, although it is loose on the spindle, until a butterfly wing strikes the stop and thereafter it will be stationary.

There are several mechanical adjustments which should be made before cloth is fastened to the needles of a ribber and knitting takes place. These adjustments are mostly of the dial and when made correctly before starting any cloth, help considerably in getting the machine to make good work.

The dial and the cylinder should both be smooth everywhere that the cloth can possibly come in contact with

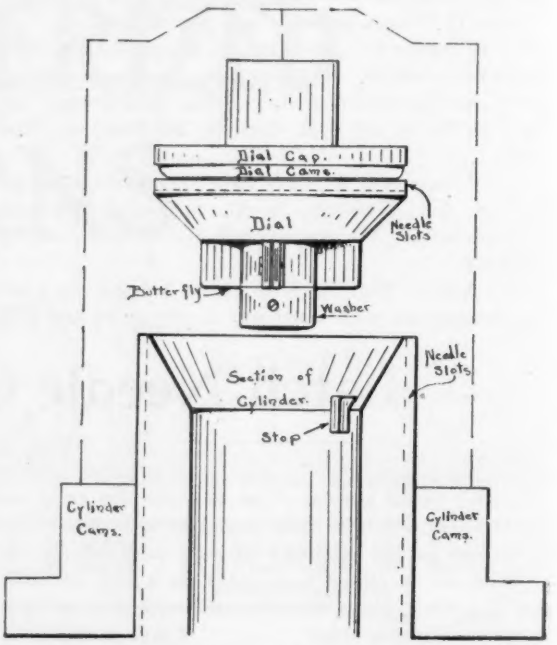

FIG. 1. SECTION OF CIRCULAR RIBBER.

them. The more important places are the inside surface of the cylinder and the under side of the dial.

The dial should be just high enough above the cylinder to allow the thickest part of the cloth to pass between them. Although the height of the dial above the cylinder partially determines the length of the loops or stitch, it should not be altered as a means of varying the length of loop or stitch. This should be done with the stitch cams.

The dial should be level. If the dial is not level, one side will be nearer the cylinder than the other. When this is true, the needles on the side where the dial is low will draw shorter loops, or a shorter stitch, than those opposite this point. The resulting fabric will be of a variable texture, varying from a tight stitch to a loose one in each half of the tube. This fabric will show a tendency to bow, because the long loops form a longer piece of fabric than the tight stitches. So, to have a fabric of uniform texture, the dial must be level.

The dial needles should be midway between the cylinder needles. Since the cloth runs down between the dial and the cylinder, it passes between a wing of the butterfly and the block on the inside of the cylinder. The dial is held in position from turning by the butterfly wing which

comes in contact with the block. The thickness of the cloth between the butterfly wing and the block varies the position of the dial. Consequently, in setting the dial, to have the needles in the correct position, either the effect of the cloth must be estimated and the dial set from this estimate, or a piece of the fabric may be placed on the machine and the dial set while it is there.

Finally, the dial cams should be so placed, with reference to the cylinder cams, that the dial needles will start to draw the loop as the cylinder needle is starting to rise after having drawn its loop; or, the cams should be so timed that the cylinder needle will draw the yarn over the dial needle just back of the rivet holding the latch.

Figures 2 and 3 show diagramatically the cams for a single feed ribber and the arms which control the movable cams.

Figure 2 shows a plan view of the dial cams, their controlling arms and the controlling arms of the cylinder cams. It also shows, by two small circles just inside the largest circle, the location of the posts which support the yoke and cause the dial cams to turn.

Within the inner circle, which represents the dial cap, are the cam outlines. A brief study will show the narrow groove or track into which the needle butts fit. The upper left section of this groove is nearly in the form of a circle concentric with the dial cap. The right hand section of the groove runs nearer to the circumference of the dial cap,

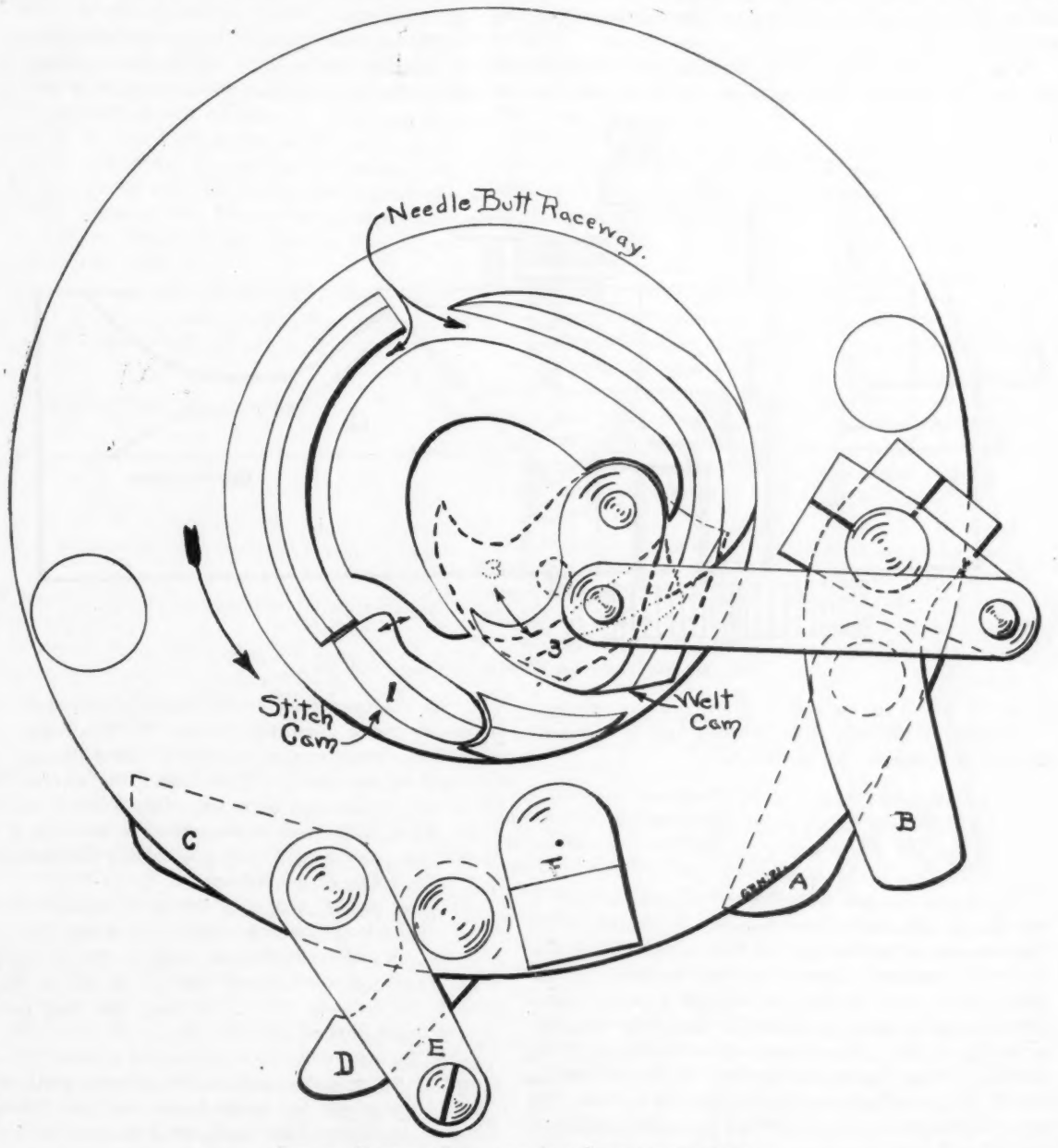

FIG. 2. PLAN OF DIAL AND ALL CONTROLLING ARMS.

particularly in the cam numbered 3. This is the cam which forces the dial needles out causing them to start knitting. This cam, which is movable, as is indicated, is spoken of as the welt cam.

The welt cam has three positions. The outermost position is shown in solid lines and the innermost position

is shown in dotted lines. The third position is half-way between these two.

When in the position shown by the full lines, the welt cam forces the dial needles far enough out so that the latch of the needle is forced through the loop or stitch held on that needle. At the same time, the needles take a hold on the yarn being fed.

When in the middle position, which is not shown here, the welt cam forces the needles out a shorter distance, great enough to cause the yarn to open the latches and not great enough to cause the latches to slide through the loops. The needles are forced out far enough to take a hold on the yarn being fed.

When in the position shown by the dotted line, the welt cam does not force the dial needles out, but holds them in, so that the latches are not opened or any new yarn grasped.

These three positions cause knitting, tucking and non-knitting as shown in this tabulation.

Welt Cam.	*Result.*
Clear Out	Knitting
Half Way in	Tucking
Clear in	Non-knitting

These positions are controlled by the arms lettered A and B. A disk, having two diameters is located on the frame in such a way that the arms will strike it when it is in certain positions. Arm A has been forced in by the larger diameter of the disk and through a pair of gears turns arm B as far out as it can go. Arm B is connected by a link to the welt cam and draws it out as far as possible. When the smaller diameter of the disk strikes arm B, it is forced part way in, as is also the welt cam, and arm A is forced part way out. Then the larger diameter of the disk will force arm B clear in (and the welt cam also) and arm A clear out.

The dial needles are forced out by the welt cam and take new yarn. Then the needle butts come in contact with cams which draw them in again, dropping the old loops over the ends of the needles and drawing the new loop through these loops (when knitting). The distance which the needles are drawn in determines the length of the loop or stitch. The cam numbered 1 is the stitch cam. This cam may be moved about its right end as an axis as is indicated. The farther this cam is forced in, the longer is the loop or stitch drawn by the dial needles. There is a machine screw which is used in obtaining the desired setting of the stitch cam, but it is not shown here. The relation of the timing of the dial needles and the cylinder needles shows the relative positions of the cylinder and dial stitch cams.

Figure 3 shows a diagramatic elevation of the cylinder cams for this single ribber and the arms for controlling the stitch cam.

The cylinder needle butts run in a groove after the manner of the dial needle butts. When not knitting, the cylinder needle butts are just above the level of the line

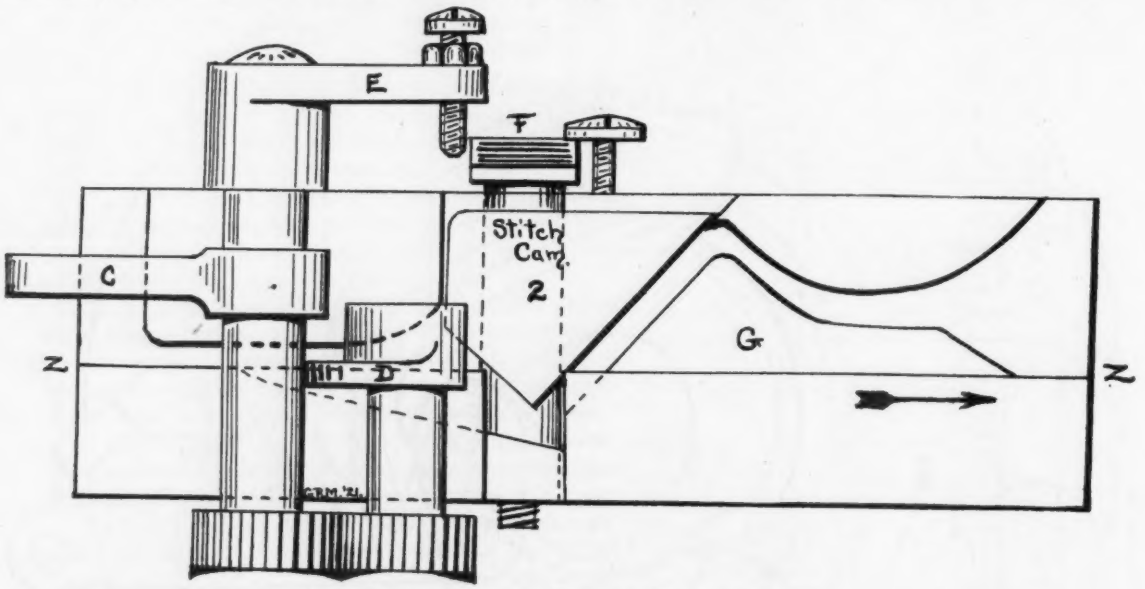

FIG. 3. ELEVATION OF CYLINDER CAMS AND ARMS.

Z-Z. As the cams move in the direction indicated, the needles are forced upward by the cam G. This forces the needle high enough so that the latch is forced through the loop held by the needle. When raised, the needles also take a hold on the yarn being fed. This action is similar to the action of the dial needles when the welt cam is in its outermost position and takes place almost simultaneously with the action of the dial needles.

The cam numbered 2, then forces the needles downward, the old loop causes the latch to close over the new yarn and slips off over the end of the needle, the needle moves farther downward and draws a length of yarn through the old loop into a new loop and then moves upward to the level of the line Z-Z.

This new loop is drawn over the dial needles. If the timing of the needles is correct, the cylinder needle will begin to rise as the dial needle drawns the yarn into the dial loop or stitch. This causes the least possible strain on the yarn, much less than the strain caused when both needles are drawing their loop at the same time.

The length of the cylinder stitch is determined by the position of cam 2. This cam is held on a vertical rod. The lower end of the rod rests on a spring, which forces it up until its upper end strikes a machine screw. This screw is the adjusting point for the stitch cam. By turning it down the cam is forced down and the stitch is lengthened.

By turning it up, the cam is allowed to rise and the stitch is shortened.

When the ribber is used to make half-hose cuffs, underwear cuffs or children's stockings, it must knit a "loose course" for transferring. That is, there must be one course of long loops or long stitches which are placed on the points of the transferring ring. This loose course is made by forcing the cylinder stitch cam 2 farther down than it is during the knitting of the rest of the atricle.

The means used to produce the loose course are the three arms C, D and E and the beveled plate F on the top of the rod holding the stitch cam. A plan view of the arms C and D is shown at Fig. 2. They are operated by the same disk which operates the welt cam arms. The arm E works in conjunction with the plate F. The front part of the plate F. is beveled off, so that as the arm E turns, the screw at its end strikes the slanting surface and, continuing to turn, forces the plate F, the rod and the cam 2 down. This position is held for one revolution and then the arm E is turned back to its first position, allowing the rod and cam to rise again.

This gives one course with a stitch longer than ordinary. The length of this loose course is determined by the adjustment of the screw at the end of the arm E.

About That Word "Shade."

BY G. LOW.

There is no term in dyestuff parlance which is so much overworked or expected to mean more things than the word "shade."

In one single booklet of an American dye manufacturer we find these expressions:

1. "The shade will be duller when acid is used."
2. "Animal fibers are dyed a yellow shade."
3. ". . . a good shade of blue is produced."
4. ". . . a brilliant shade of orange."
5. ". . . may be shaded with an acid yellow."

Obviously it is a most versatile little word, because its exact meaning cannot be conveyed unless one refers to the text to find out what it is all about. Perhaps a reform would hardly justify itself, but, personally, I insist that all my assistants use a word which conveys the exact meaning when conversing with me about color, and I get a great deal of satisfaction out of it. The cause of the condition is half analysed by so speaking. One "gets down to brass tacks," to use a rather inexplicit but well-understood comparison.

Let us take color analytically and words synthetically and see if we can improve our conversation. First, color is a sensation, just as sound is. Vibrations of certain wave-lengths do something to the organs in our ears and we have a sensation which we call hearing, and we call the vibration "sound." Another set of wave-lengths does something to the nerves in our eyes and we call it seeing, and "color" is what we see. Of course, we see "shape," too; but that is beside the point.

These color vibrations are produced three ways: absorption, interference, and refraction. The last two are interesting to the physicist. Just now we are colorists, and the production of color by absorption is what we are interested in.

Everyone is familiar with what happens when we stick a glass prism into a ray of sunlight. The ray of light splits up into the colors of the rainbow (spectrum). It is a poor rule that doesn't work both ways, and this is a perfectly good rule. If all colors (in the form of light rays) are converged into one ray, that ray is white; and if that ray is thrown on to a piece of wool died with roccelline, the wool will appear red. Nothing so remarkable about that, excepting that it illustrates what we are talking about—"absorption." The dye *absorbs* all those rays which we just converged, excepting the red one, which it *reflects* against our eye, giving us the sensation which, for the sake of simplicity, we call seeing red.

Now, if this self-same ray be directed against a dyeing of guinea green, an entirely different sensation is produced—that of seeing green—because the red as well as all the other colors, excepting green, is absorbed. So if we made a dyeing of a mixture of these two colors the whole set of vibrations in that ray of light would be quenched or absorbed and, nothing being reflected, nothing would act on our eyes, and therefore we have *no* sensation and that condition we call seeing black.

If we have the sensation of seeing yellow and seeing blue at the same time (much the same phenomenon as hearing a chord on the piano) we see green, that is, we have the same or a very similar sensation to that produced when green light strikes our eyes. That is why mixtures of yellow and blue dyestuffs produce green dyeings.

HUE.

In fact, all colors produced in this world, excepting the spectrum, are mixtures. There are no *pure* colors; but there is always, of course, a *predominating* color. Let us call this the hue of *that* particular color. According to that, we would speak of a beautiful red *hue* rather than a beautiful red *shade*.

CAST.

All colors being mixtures, there would be another color next in importance to the predominating one. Let us call this the *cast* of that color.

Thus we would say that Xylidine Scarlet was a color of a red hue with a yellow cast, not a yellow *shade* of red. Magenta is a color of a red hue with a bluish cast, not a blue *shade* of red. By the pureness or purity of a color we mean, or should mean, the lack of cast. That is, the less of the secondary color in the mixture the *purer* the predominating color and the nearer the approach to the spectrum standards (which, however, can never be reached).

TINT.

We must understand, also, that the addition of either black or white to a color will affect its purity. If we add white to a color we get a "tint" of that color. Pink is a *tint* of red, lemon a *tint* of yellow, amethyst a *tint* of violet, etc. We ought not to say that pink is a *shade* of red.

SHADE.

But now that we have the poor word down, let us not kick it but give it its due. When we add black to a color we can properly use the word "shade." Maroon is a shade of red; so are claret, garnet, russet and brown. Plum and puce are shades of violet. Olive is a shade of green, and terra cotta a shade of orange. These are very properly

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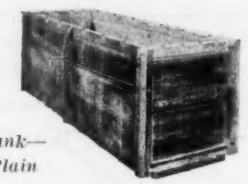

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called *mode shades*. Of course, we could have tints of these shaded colors, and, conversely, it should be permissible to speak of "shades of tints," which are nothing more than light colors to which grey has been added.

We speak of deep shades and light shades, by which we imply the use of more or less dyestuff. At this point theory and practice have a little falling-out, as they frequently do in this world. We cannot make a color weaker in practice without adding white. (I do not refer to the use of Glauber's salt, but to the dyeing of white materials with lesser amounts of dyestuff.)

Therefore, by "light shades" all we can mean is "tints," or, technically, a "weak" or "light" dyeing. A "deep shade" is a "heavy" dyeing.

By the word "tones" we mean the varying degrees from black through a color to white.

BRILLIANCY.

One other quality of color is their brightness or dullness. It refers to nothing but the comparative *amount of light* reflected by a color. It is possible by various scientific methods to determine this comparison, and it has been found that (of the spectrum colors) orange yellow is the most brilliant, while violet is the least so. In mixed colors brilliancy would also be controlled by cast, intensity and tone.

Therefore, it is possible for a variety of casts of the same hue to possess different degrees of brilliancy, so in some cases it would be quite correct to say bright shade or bright tint.

To sum up, a color has—

1. Hue—its predominating color.
2. Cast—its secondary color.
3. Brilliancy or dullness—the amount of light it reflects.
4. Intensity—strength or weakness.
5. Tone—the absence or presence of black.

And the word "shade" really only refers to the last half of the last quality.—*The Dyestuff Reporter.*

"Present World Economics."

Under this title, Alfred H. Cowles, of Sewaren, N. J., has written an interesting and informative booklet dealing with economic conditions and affairs of the world. Mr. Cowles has long been a close student of world economics, and has gained a close familiarity with the conditions both in this country and abroad which sway the business trends of the world. In his booklet he discusses the repayment of the ten billion dollar Allies' debt to the United States; the fundamental nature of money, fiat, capital and interest; the Civil War compared with the World War inflation, and the need of an international bank as a dynamic supplement to the League of Nations. An addenda contains a chart showing eighty years' average prices of commodities and wages in American currency, with the world's production of gold and silver and their comparative values; and another chart plotting the trend of average prices in American and German commodities in gold, American average wages in gold over the same period, from 1840 to 1920; and the Civil War inflation compared with the World War inflation.

Complimentary copies of this booklet will be sent to any cotton manufacturers interested upon application to the Electric Smelting & Aluminum Company, Inc., Lockport, N. Y., of which Mr. Cowles is the president.

The Yarn Market.

Prices in the Philadelphia cotton yarn market started the past month at a rather low level, held steady for a matter of ten days or so, and then softened some more to a still lower level, were a little unsettled for a while and then, toward the end of the period, started back upward again.

The latter part of March found prices generally about a cent lower than those reported in the list published last month on weaving yarns, while knitting yarns had eased off between a half a cent and a cent a pound and combed yarns had lost approximately five cents. These were quotations on southern yarns. Eastern carded and combed hosiery yarns at this time were holding firmer.

This level—with southern two-ply 30s skeins at 35½ cents, 30s/2 warps at 37 cents—was maintained for a while, and then prices on most groups began to feel the effect of an absence of demand and an effort on the part of spinners to move yarns, which took form in the offering of stock supplies for sale at "sacrifice" rates. This resulted in another drop in prices, in the southern group particularly, and in the middle of April, prices on southern yarns were quoted about as follows: single skeins, 10s, 28½ cents against 29½ cents a month previous; 10s single warps, 29 cents, a loss of a cent over the same period; two-ply skeins and warps had each lost a cent and a half on 10s, being quoted at 28 and 29½ respectively; and 30s hosiery yarns from the South losing a cent from their previous price of 36 cents.

This latter drop also affected the northern group to an extent, an average loss of a penny a pound being felt in practically all counts.

In regard to business and inquiries, the market generally experienced a continuation of the sluggishness that has prevailed here for a number of months. There was reported some business received for knitting yarns and yarns for electrical wiring purposes, although these orders were the exception and came as the result of specific causes and were not to be taken as an index to an improved situation in the trade generally.

Toward the end of April, however, there appeared to be some little improvement in inquiry, and this was accompanied by a somewhat higher range of prices, although these prices were not evident in the published quotations. Factors in the market seemed much encouraged as to the outlook, and some reported that it appeared their customers were believing that cotton yarns at prevailing prices should be regarded as a purchase. Another house stated it had found that its customers were re-instating orders for yarns that had been long held up, and that some broader inquiry was apparent. At practically every hand it was agreed that yarn customers as a whole are recognizing that yarn quotations are now down to what will most likely be their ultimate low level for this year, and are preparing to cover their requirements accordingly.

The better prices on some of the yarns, in the opinion of one factor dealing in southern carded weaving yarns, was attributable solely to the curtailment program instituted by a number of southern spinners and reported here last month. This house also handles a good grade of knitting yarns, and on these yarns they state that spinners are stiffening their prices and are rejecting orders proffered at prices which would have been jumped at a week or

so back. They say that the shutting off of production in their mills so reduced the surplus stocks on hand as to enable this stand to be taken.

Quotations published in the Philadelphia market on April 17 follow:

Southern Single Skeins.

4s to 8s	27	10s	28½
12s	29	14s	30
16s	30½	20s	31
24s	32½	26s	33
30s	34½		

Southern Single Warps.

8s	28	10s	29
12s	29½	14s	30
16s	30½	20s	32
26s	34	30s	35
40s	50		

Carpet and Upholstery Yarn in Skeins.

8s and 9s 3-4 slack	26
8-2-3 tinged tubes	21
8-3-4 hard white warp-twist	25
8-3-4 hard twist waste	20

Southern Two-Ply Skeins.

8s	27	10s	28
12s	28½	14s	29½
16s	30	20s	31
24s	32	26s	33
30s	34 @34½	40s	48 @50

Southern Two-Ply Warps.

8s	28½	10s	29½
12s	30	14s	30½
16s	31	20s	32
24s	33	26s	34½
30s	35 @35½	40s	50

Southern Two-Ply Combed Peeler Skeins and Warps.

8s to 16s	45	20s	48
24s	50	30s	55
40s	65	50s	72 @75
60s	82 @85	70s	90 @95
80s	$1.00		

Southern Frame Spun Carded Yarn on Cones.

8s	27½	10s	28
12s	29	14s	29½
16s	30½	18s	31
20s	31½	22s	32
24s	33	26s	33½
30s	35	40s	50
30s double carded			40@42
30s tying-in			32@33

Northern Mule Spun Carded Yarn Cones.

10s	32	12s	33
14s	34	16s	35
18s	35½	20s	37
24s	38	26s	39
30s	42	40s	52

Northern Mule Spun Combed Peeler Yarn on Cones.

10s	42	12s	43
14s	44	16s	45
18s	46	20s	47½
22s	49	26s	51
28s	55	30s	57
36s	65	38s	66
40s	68 @70		

A new size of Alligator steel belt lacing has been designed by the Flexible Steel Lacing Co., 4607 Lexington St., Chicago, Ill. It is known as size No. 1, and is designed especially for belts from 1/16 to 3/32 of an inch in thickness. The size known as No. 00 was too light, while the next size, No. 15, was too heavy, to care for the sizes of belt for which this new lacing was brought out. This new size completes the range of sizes of lacing made by this company to care for belts ranging from tapes up to belts 5/8 of an inch thick. It is also announced that on the smallest two sizes, a special holder frame is furnished which expedites the application of these miniature sizes.

Butterworth-Judson Corporation, New York City, manufacturers of acids, intermediates and dyestuffs, has cancelled its contract with L. M. Bowes, under which Mr. Bowes, doing business as the Standard Color Company, was the sole seller of Butterworth-Judson dye products. It is the intention of the corporation to market all their products through their own selling force. This concern also announces that, effective April 8, their sales offices are located at 30 Church Street, New York City, the expansion of their sales department necessitating the changing to larger quarters.

The Value of a Smile.

No finer gift was ever bestowed upon a man than the power to smile. Very easy is it to smile when the sun is shining, when things are coming one's way, when there is nothing to worry you, when the whole world seems to be singing, but to smile when the clouds are gathering, when things are not coming right, when defeat seems inevitable, when losses are apprehended, is the real gift, and will save a man from the bridge of adversity. The country has had a bad case of nerves. Gloom has pervaded its atmosphere. It seems so strange after the jazz period of the post-war days that they should ever come to a halt and matters brought to a stage where everything has seemed to go wrong. The remedy is to smile, smile and smile again, no matter how barren the envelopes may be that come to one's desk in the mails of the day, and no matter how difficult the problems may be, no matter how hard the struggle may be. We can save ourselves a wonderful amount of real worry, and after all, worry has never gotten a person anywhere. We can solve our problems, we can hew away at difficult situations just so long as a smile is on our face and a song on our lips. This is not difficult. It is but natural. It isn't heritage of a few, it is the opportunity of all.

Smiling is the remedy we offer the nation for the dispelling of every bit of gloom, for the removing of every bit of depression. Every little thing that brings a smile is an asset to the nation and everyone who smiles is a true citizen of the nation.—J. H. Tregoe.

The Electric Smelting & Aluminum Co., Lockport, N. Y., have recently begun the marketing of a new kier boiling compound under the name of "Sol-Esco," a product which was formerly sold by Wm. T. Finkell, of New York City, under the trade name of "Peerless Compound." After the recent death of Mr. Finkell, however, this company took up the sale of this material direct under the new name.

In the marketing of this new compound, the company lays much emphasis upon the necessity of introducing more scientific control over the boiling-out process than has been customary. They point out that the process of boiling-out cotton fibers is still largely traditional and, while it is the most important step in the entire series of bleaching and dyeing operations, boiling-out has been the most neglected. This new material, it is declared, is designed to remove the impurities, resulting in pure cellulose, and its use is said to materially reduce the use of soda ash or caustic soda, with their attendant bad effects upon the goods, in the kier boil, and is said to produce a better bottomed piece of goods, uninjured by alkaline action, that will take the dye more evenly; it is also claimed to be particularly suitable for removing the nitrogen-containing and ether-soluble substances which cause yellowing of the bleached cloth in the steam test or during storage. It is further stated that the time of boiling out can be reduced 30 to 50 per cent, depending upon the construction of the goods.

The company also announces that Wm. T. Stearns, of New York City, who is well known in textile circles, is representing them on this product.

It is better to know all that you tell than to tell all that you know.

AUTO GYP
Process of Dyeing

Skeptical?

Well, we can't blame you for that. Who wouldn't be? Every manufacturer we have interviewed has been skeptical because AUTOGYP does so very much and does it in too simple a way to easily convince him of its true merits.

That's why we give you a free test with your own material—under your own conditions—with your own equipment—in your own mill at our expense.

There is no longer any need of bleaching your cloth preparatory to dyeing and both are accomplished in three hours time. No special equipment is necessary and no added expense involved.

Let us show you how you can produce better finished goods at a great saving in time and materials.

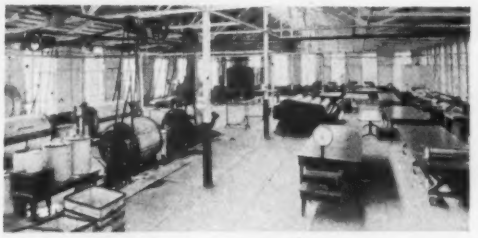
SURPASS CHEMICAL CO. FOR USE IN AUTOGYP PROCESS OF DYEING AUTOGYP PATENTED IN U.S.A. SEP. 26, 1916 IN CANADA OCT. 10, 1916 ALBANY N.Y.

Write for further particulars.

Surpass Chemical Co.,
Albany, N. Y.

THE AMERICAN MILL VILLAGE LAUNDRY

Saves Labor Hours—Keep Homes Contented



This American Mill Village Laundry does the family washing for nearly all the employees of the Brandon Mills, at Greenville, S. C.

You, too, can add to production 1000 labor hours weekly

You have a heavy investment in every mill operator. It costs money to train them and provide homes for them.

Make that investment pay out by keeping your workers on the job every day. Install an American Mill Village Laundry and stop wash-day lay-offs.

The American Mill Village Laundry shown above will add 2,000 production hours to your weekly output by relieving 200 women of wash-day duties.

It will add to your working force the equivalent of 17 trained operators; save you the $10,000 to $15,000 you'd have to invest in homes for them.

And it will practically pay for itself. Rush times are coming; get ready now. Mail the coupon today.

The American Laundry Machinery Co.

Specialty Department C

Norwood Station Cincinnati, Ohio

This coupon will bring full details—
have your secretary mail it now.

The American Laundry Machinery Co.,
Specialty Department "C"
Norwood Station, Cincinnati, Ohio.

Gentlemen:—Please send me full particulars about The American Mill Village Laundry.

Signed .....

Company .....

City ..... State.....

TOLHURST

The Extractor which is pre-eminent in High Speed Production

Here is an illustration of its usefulness in the Textile field. It represents two 48″ engine driven **Tolhurst** "Self-Balancing" Extractors whizzing piece goods after dyeing. This plant, a well-known silk-dyeing factory, has sent us seven repeat orders—a definite proof of satisfactory service.

If you are interested in high-speed production, where hydro-extraction plays or should play a part, send for particulars.

Tolhurst "Self-Balancing" Extractors are constructed with baskets 12″ to 72″ in diameter and arranged for motor, countershaft or engine drive from above or below.

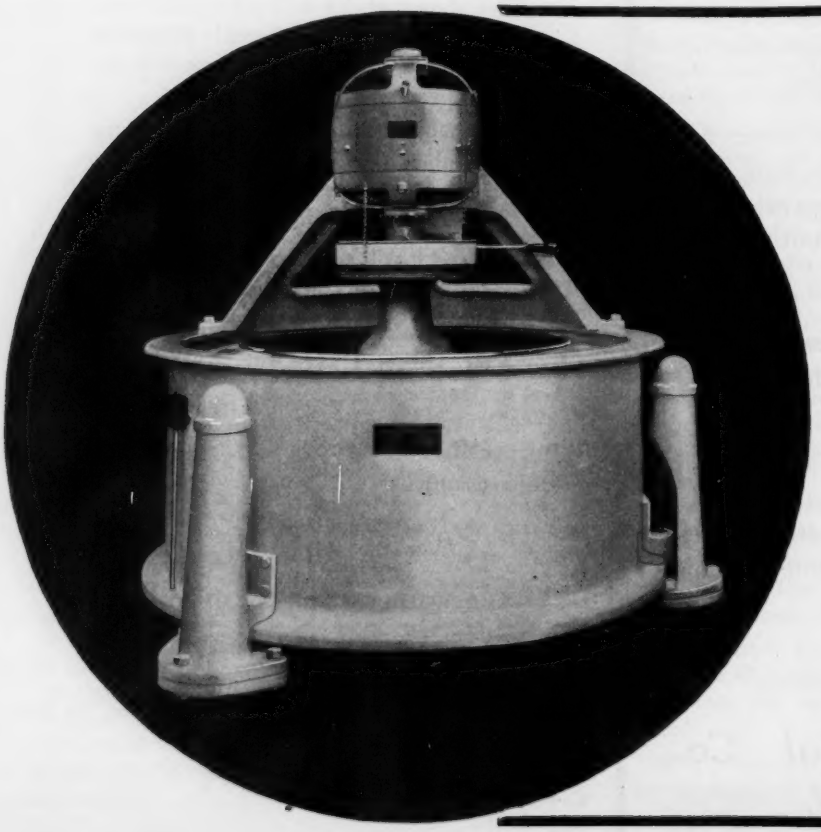
TOLHURST MACHINE WORKS

ESTABLISHED 1852 — Southern Rep. FRED H. WHITE, Realty Bldg. Charlotte, N. C.

NEW YORK OFFICE, 111 BROADWAY — Western Rep. JOHN S. GAGE 8 So. Dearborn St. Chicago, Ill.

San Francisco Rep. B. M. PILHASHY, Merchants Exch. Bldg. San Francisco, Cal.

TROY, NEW YORK — Canadian Rep. W. J. WESTAWAY CO. Main & McNab Sts., Hamilton, Ont. 400 McGill Bldg., Montreal



The Safety First Extractor

"Hercules-Electric"

SIZES 6" to 72"

EAST JERSEY PIPE CO.

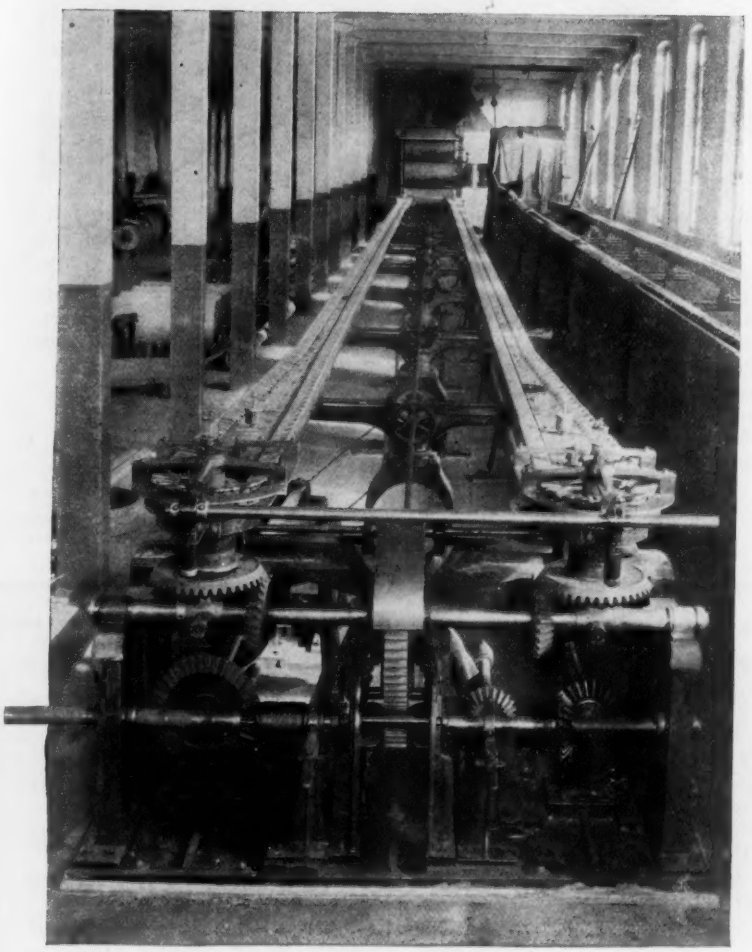
PATERSON, N. J.

GREENVILLE, S. C. E. S. Player, Masonic Temple

LOS ANGELES, CALIF. A. Walton, 1513 Westmoreland Ave.

CANADA Whitehead Emmans, Ltd. Montreal

A Few Details of the Drive on a Butterworth Tenter



Note particularly that the large main driving gear is equipped with universal joint so that it does not oscillate when tenter is operating with vibratory motion. Those bearings on the main driving shaft are all bronze bushed. The cross arm is of cast steel.

The sturdiness and mechanical refinement which you see in this 90-ft. vibratory tenter is characteristic of all Butterworth machinery, whether it's a bleacher, dryer, singeing machine, mercerizing Range, Hydraulic Range, Dyeing machine, Soaping Machine, Mangle, Calender, or Color Kettle.

Let us send a booklet on the machine in which you are interested.

FINISHING
Butterworth
MACHINERY

H. W. BUTTERWORTH & SONS CO.

Established 1820

PHILADELPHIA, PA.

Canadian Representative, W. J. Westaway Company, Hamilton, Ontario, Canada.

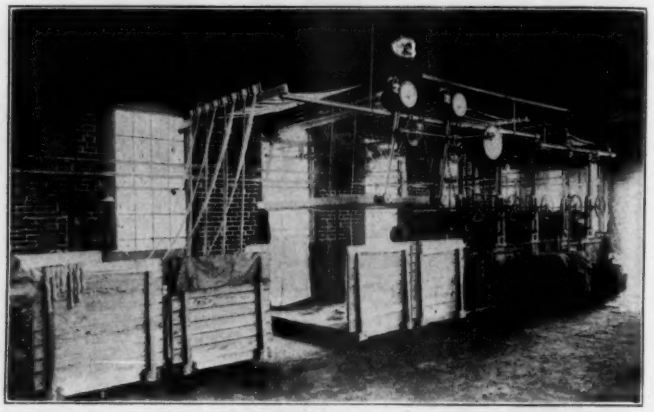
Greenville, S. C., Office: Masonic Temple Building. Milton G. Smith, Mgr.

Providence Office: Turk's Head Building.

Five Compartment

WARP DYEING EQUIPMENT

Continuous System Method



DYES DuPont **Napthanil (Red-Pink-Blue and Orange)** in One (1) Run through the machine, and Dyes all Vat Colors **in Two (2) Runs,** producing absolutely level shades, and handles the warps in such a manner as to leave them in the very best possible condition for beaming and weaving.

The successful handling and dyeing of Warps by a Continuous System Operation is only made possible by the use of specially designed Tension Controls, etc., built and used by us in the various Continuous System Warp Dyeing Equipments which we build for all colors, including Indigo.

COCKER MACHINE & FOUNDRY COMPANY

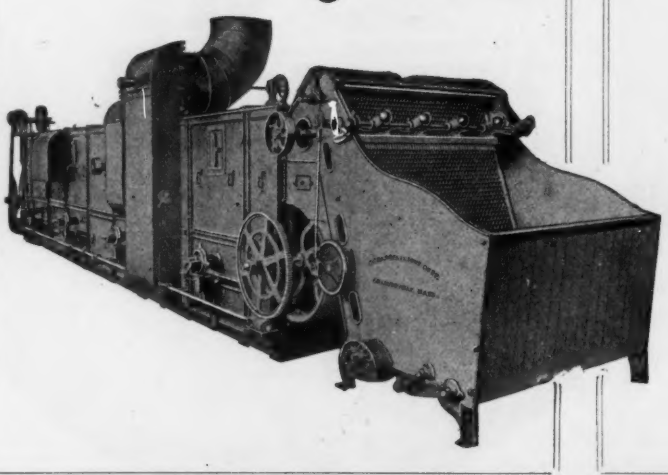
Gastonia, North Carolina

Specialists in Designing and Manufacturing Machinery for Making and Handling of Warps

DESIGNERS AND BUILDERS OF

WARPING MACHINERY		WARP DYEING MACHINERY		WARP BEAMING MACHINERY
Linking Warpers	Indigo Vats	Sulphur Vats	Warp Coilers	Long Chain Beamers
Balling Warpers	Boiling Boxes	Sizing Machines	Scotch Systems	Short Chain Beamers
Beaming Warpers	Wash Boxes	Continuous Systems	Dye House Ballers	Warp Splitters

Sargent Dryers



Perfect Satisfaction

Doubtless in many things that you have bought you have had that feeling of perfect satisfaction that comes from the use of the best that can be bought.

There are over 250 mills who have that feeling about their drying machines—users of Sargent Dryers—machines that take the moisture out of material rapidly and thoroughly without damage to the stock and with less trouble, power and expense.

The quality of the material is preserved. and a soft "feel" of the yarn is obtained.

An experience of 50 years of Dryer manufacturing has made Sargent superiority possible. There are over 40 sizes of Sargent Dryers—for cotton, linters, rags, wool or flax—also carbonizing.

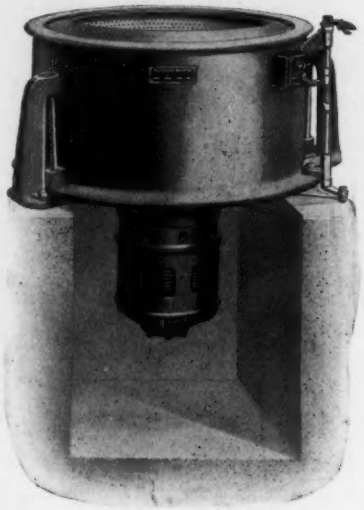
Write today for catalog.

C. G. SARGENT'S SONS CORPORATION

GRANITEVILLE, MASS.

Fred H. White, Southern Agent, Charlotte, N. C.

FLETCHER MOTOR DRIVEN HYDRO EXTRACTORS



Type EU
Electric Underdriven Extractor

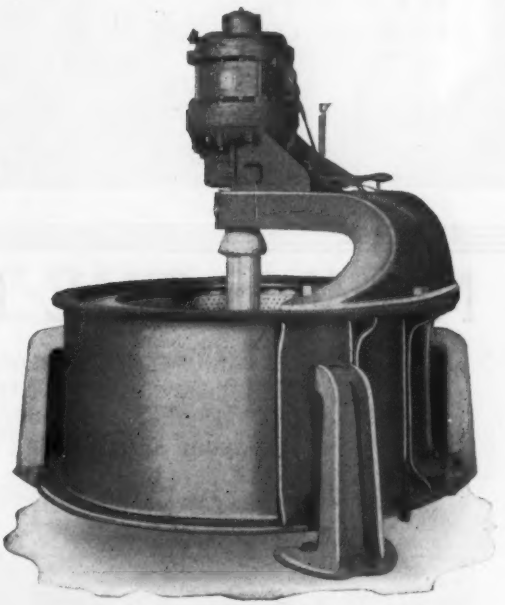
are designed to get up to speed in the shortest possible time, to stop quickly, and to require the minimum amount of attention.

A touch on the button takes care of the starting.

Application of the brake lever automatically shuts off the current.

Whether your choice is the underdriven whizzer with the rotor on the basket shaft, or the top driven machine with its direct connected vertical motor, you have the satisfaction of knowing that there is practically no maintenance cost.

Because there are no belts, clutches, or other complicated driving mechanism to wear and need repair, upkeep charges are so small that they may be disregarded.



Type VM
Top Driven Extractor with Vertical Motor

See our exhibit at the Knitting Arts Exhibition, Philadelphia, May 22nd-26th

FLETCHER WORKS

(Formerly Schaum & Uhlinger)

Glenwood Avenue and Second Street

PHILADELPHIA, U. S. A.

New England Representatives: HURRICANE ENGINEERING COMPANY, 53 STATE ST., BOSTON, MASS.
Western Representatives: R. R. STREET & CO., 28 N. CLINTON ST., CHICAGO, ILL.

Manufacturers of Fletcher Narrow Fabric Looms

Sulphurous Acid Generator

A Paying Investment

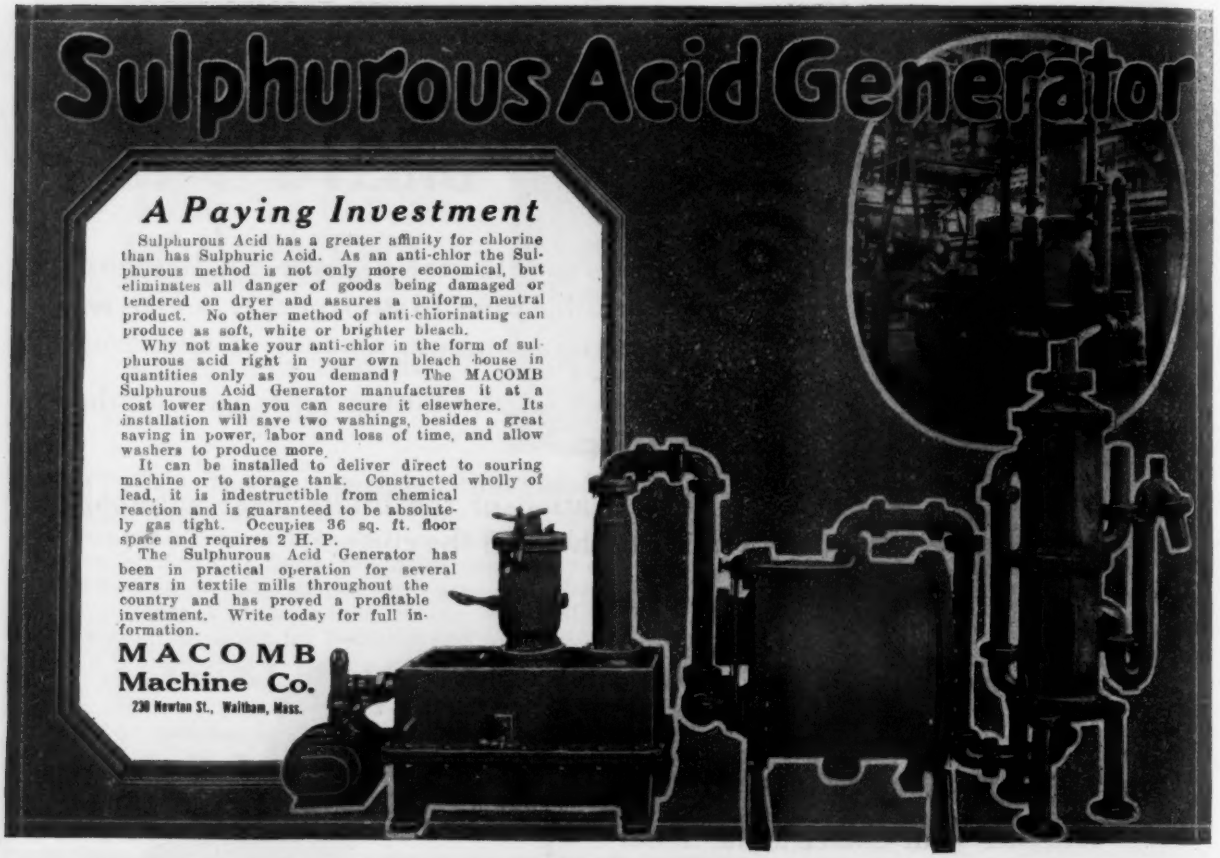
Sulphurous Acid has a greater affinity for chlorine than has Sulphuric Acid. As an anti-chlor the Sulphurous method is not only more economical, but eliminates all danger of goods being damaged or tendered on dryer and assures a uniform, neutral product. No other method of anti-chlorinating can produce as soft, white or brighter bleach.

Why not make your anti-chlor in the form of sulphurous acid right in your own bleach house in quantities only as you demand? The MACOMB Sulphurous Acid Generator manufactures it at a cost lower than you can secure it elsewhere. Its installation will save two washings, besides a great saving in power, labor and loss of time, and allow washers to produce more.

It can be installed to deliver direct to souring machine or to storage tank. Constructed wholly of lead, it is indestructible from chemical reaction and is guaranteed to be absolutely gas tight. Occupies 36 sq. ft. floor space and requires 2 H. P.

The Sulphurous Acid Generator has been in practical operation for several years in textile mills throughout the country and has proved a profitable investment. Write today for full information.

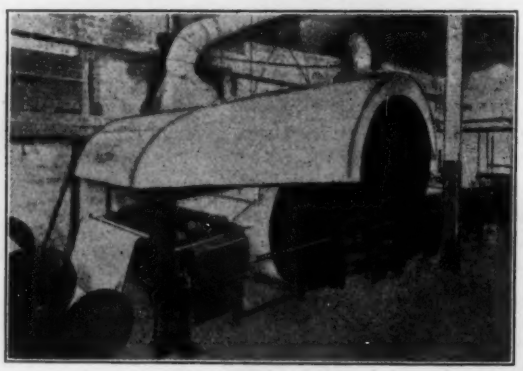
MACOMB Machine Co.
230 Newton St., Waltham, Mass.



NOW IS THE TIME

To examine your Slasher Room. It may be that the heat and moisture are not properly exhausted. The two, combined, make the room almost unbearable to work in and prevent efficient and satisfactory results.

You can remedy these defects and obtain more production if you install

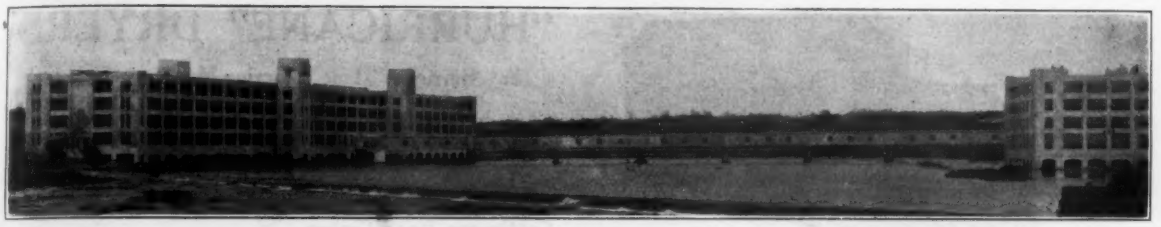


PICKENS SLASHER HOODS

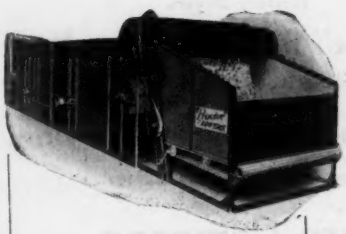
They are the result of 20 years of practical experience and are pronounced by experts as being the most perfect slasher hood on the market.

A Postal Request Will Bring You Full Information.

R. O. PICKENS SLASHER HOOD COMPANY
Spartanburg, S. C.



Largest Cotton Mills use "Proctor" Drying Machines



"PROCTOR"
AUTOMATIC
COTTON DRYER

(Single Conveyor Type) for dyed and bleached cotton, linters, rags, mixtures and all loose materials. Send for Catalogue No. 52 and become acquainted with the superior features of this machine.

There are suitable types of "Proctor" Dryers for all textile raw materials and products.

AUTOMATIC AND TRUCK SKEIN YARN DRYERS
PACKAGE YARN DRYER
AUTOMATIC LOOP DRYER
HOUSING AND CIRCULATION SYSTEMS FOR TENTERS

"Proctor" DRYERS
The best dryers in the world for TEXTILES

Five of the seven "Proctor" Automatic Conveyor Dryers at Riverside and Dan River Cotton Mills, Inc.

THE Riverside and Dan River Cotton Mills, Inc., at Danville, Va., is an institution of which the owners and the nation at large are justly proud.

Commanding high praise for its construction, this mill was carefully and capably planned to the last item of equipment. An important provision was the most perfect drying machinery for its modern dye plant.

With 412,000 spindles, 12,790 looms and a tremendous output of colored goods, the drying of the raw stock is entirely taken care of by seven "Proctor" Automatic Single Conveyor Dryers.

The selection of these machines was based on their wonderful reputation for dependability in operation, high output, and uniformly perfect quality of dried stock—earned by hundreds of "Proctor" Dryers throughout the Textile world.

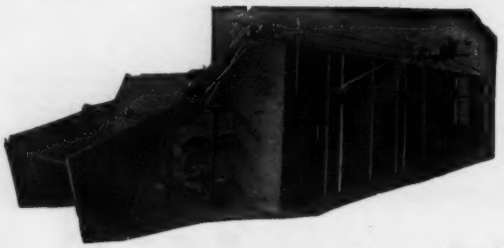
"Proctor" Dryers live up to their reputation—due to superior design and construction in every detail, representing the makers' forty years' experience in building drying machinery exclusively.

PROCTOR & SCHWARTZ, INC.

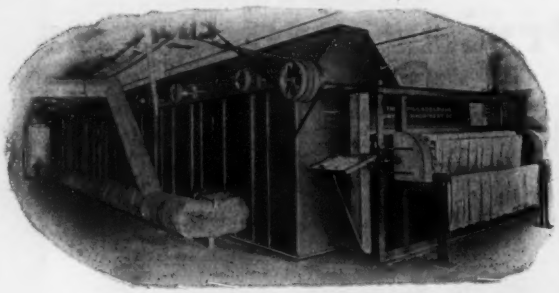
Incorporated, 1883 as The Philadelphia Textile Machinery Co.

PHILADELPHIA, PA.

Southern Representative, H. G. MAYER, Charlotte, N. C.



Automatic Stock Dryer for Wool, Cotton, Hair, Linters, Rags, With Patented Spirally Woven Sectional Wire Cloth Conveying Apron



Automatic Yarn Drying and Conditioning Machine

For Cotton, Woolen, Worsted, Silk, Linen or Jute Yarns

"HURRICANE" DRYERS

The "Hurricane" Line of Drying Machinery Includes

Automatic Loop Dryers
For Underwear, Toweling, Piece Goods, Silks, Plushes, etc.

Continuous Piece Carbonizing Machines

Automatic Yary Dryers
For Cotton, Worsted, Jute, Silk and Artificial Silk Yarns.

Truck Dryers for Yarn
Tape, Braid, etc.

Automatic Raw Stock Dryers
Single and Multiple Apron Types for Wool, Cotton, Linters, Hair, Flax, etc.

Automatic Raw Stock Carbonizing Machines

Automatic Yarn Drying and Conditioning Machines for all kinds of Yarn.

Truck Dryers for Yarn
Dyed on Cones.

Hosiery Dryers

A "Hurricane" Dryer for Every Material

Complete Equipments for

Bleaching, Dyeing and Drying.

Send for illustrated Catalogs.

The Philadelphia Drying Machinery Company

Main Office and Works
Stokley Street above Westmoreland

Philadelphia, Pa.

Boston Agency
53 State Street

FILTERS

PRESSURE GRAVITY

Especially designed to meet all requirements of Textile Mills.

Economical in upkeep.

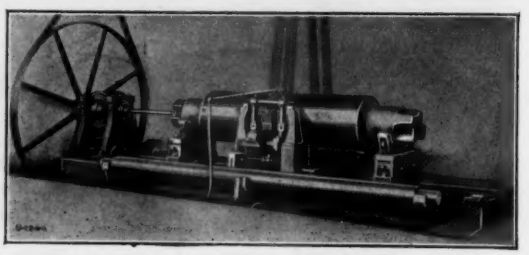
Perfect satisfaction.

NORWOOD ENGINEERING CO.

Florence Mass., U. S. A.

CHAS. M. SETZER, Southern Representative,

Charlotte, N. C.



TEXTILE GRINDER

This is a special roll grinding machine performing accurate work. It has a swinging carriage hanging on knife edge and permits a result of perfect circle absolutely straight. Machine includes double wheel carriage, driving mechanism and double drum countershaft. Carriage travels back and forth automatically. Guide roll is arranged for concaving and convexing rolls. Suitable for rolls 36" to 40" diameter, 216" long. For Linoleum, Fibre, Sheet Brass, Copper, Steel, Paper rolls.

D'OLIER CENTRIFUGAL PUMPS **BLAISDELL COMPRESSORS**
D'OLIER HYDRO-EXTRACTORS

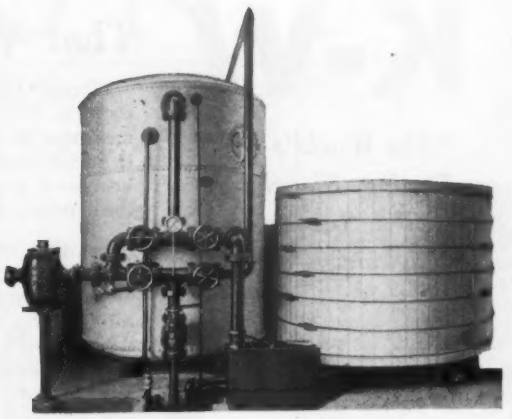
Bulletins and detailed information upon request.

The United States and Cuban Allied Works Engineering Corporation

165 Broadway, New York

Works: Bradford, Pa. *Cable, "Idolwax," New York*

Dyeing Efficiency Improved by Eliminating Yarn Breakage



A well-known cotton mill manufacturing tickings had to run their dye house on part time because yarn breakage in the beamers delayed things so that they could not keep up with the dyers.

Sets, composed of six individual warp chains of from 8,000 to 12,000 yards in length and weighing approximately 2,000 lbs. were run through at one time. The yarn was given a continuous run through a boiling 1% caustic soda solution followed by 2, 3 or 4 runs through the indigo vat, the hydrosulphite vat being the one used. The yarn was then washed and dried and sent along to the beaming room.

Due to the presence of lime salts in the water supply a precipitate was formed in the dye bath that deposited on the yarn, causing individual threads to adhere, and when they were run over the beamers the yarn broke repeatedly necessitating frequent stopping of the machine to piece up the broken ends.

In November, 1919, they installed Permutit Water Softening equipment that removed all the hardness (lime and magnesia) from their water supply. A recent report stated:

> ".....Now we have no trouble at all and our light yarn which we make 12,000 yards long, beams in 3½ hours where before I have seen it run into the third day and in lots of cases it has run into two weeks. In other words, the beaming room, which was always spoken of as the 'narrow neck of the bottle,' and as such was unable to co-operate with the other departments of the mill, is now able to keep pace and has without any additional equipment or labor, been able to take up the beaming of white yarn in addition to an increased production of blue yarn.
>
> "This improved beaming is naturally a very big item when the same yarn passes to the slasher tender and from there to the weaver. Furthermore, the saving in beaming room labor alone amounts to more than $6,000.00 annually (6 girls at $20.00 per week), and the entire investment in Permutit equipment paid for itself in less than one year."

It will pay you to investigate your water supply. We make all analyses free of charge.

Write us today.

Send for this free booklet

This booklet contains valuable information that every mill operator should know about his water supply. Sent free, post paid.

The Permutit Company
440 Fourth Ave. New York

K-W

"The World's Best Dyeing, Bleaching and Scouring Machinery—

That Which Deserves to Live—Lives

Whether it be a man or a manufacturer, if his product be merely mediocre he will be left alone—if he achieves superiority he will become a target for the shafts of the envious few.

But that which deserves to live—lives. The fact that Klauder-Weldon Machinery is still good after over a half-century's use in score of mills is proof that it lives—has deserved to live. The fact that this same machinery, after the long ravages of live steam, heat and alkalis is still more efficient and economical than any other modern machinery of its kind, is one reason why we can say, without boasting, that it is "The World's Best Dyeing, Bleaching and Scouring Machinery."

When you buy K-W Machinery, you MUST be satisfied, for K-W reputation must always be maintained. Our years of experience and the efficiency of our methods of manufacture guarantee economy in first cost, and economy throughout a long life of efficient service under the severest usage.

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Soluble, a Jet Black suitable for vigoureux printing

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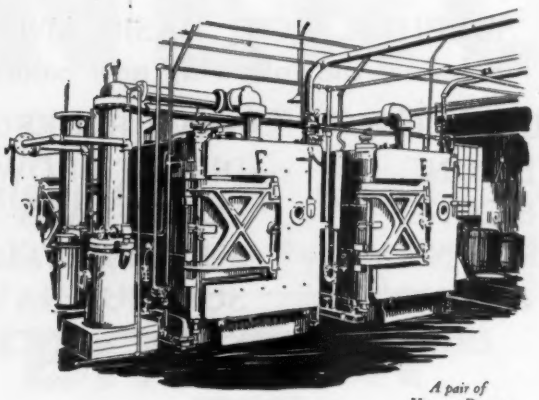

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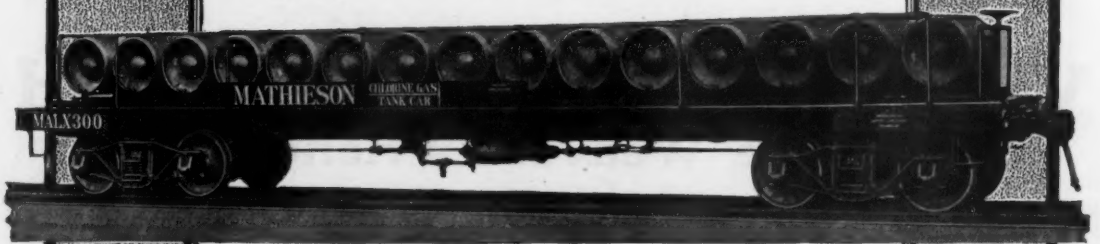

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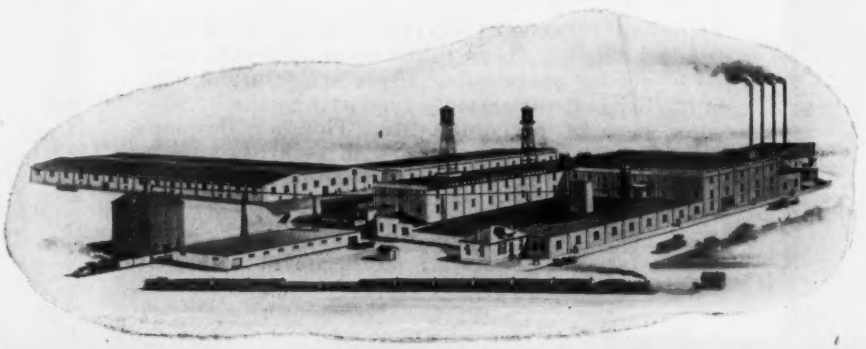

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with thick, strong nap that does not pull out and is of uniform length so that it will clear the rolls of all short fibre.

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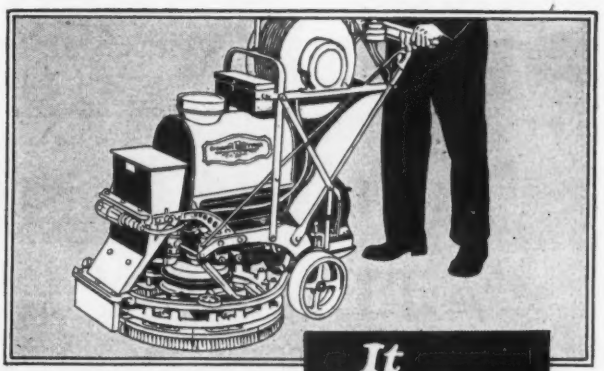

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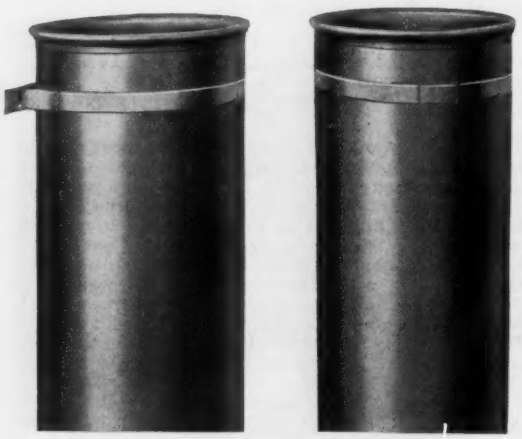

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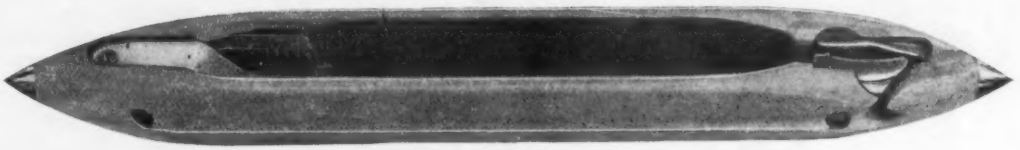

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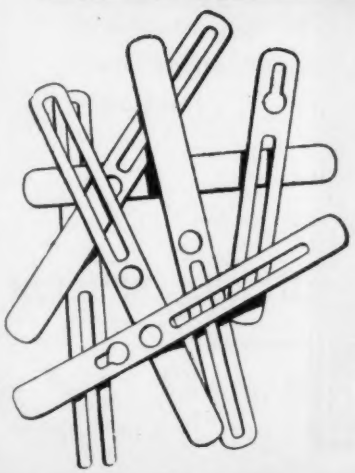

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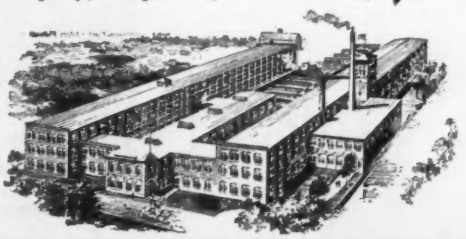

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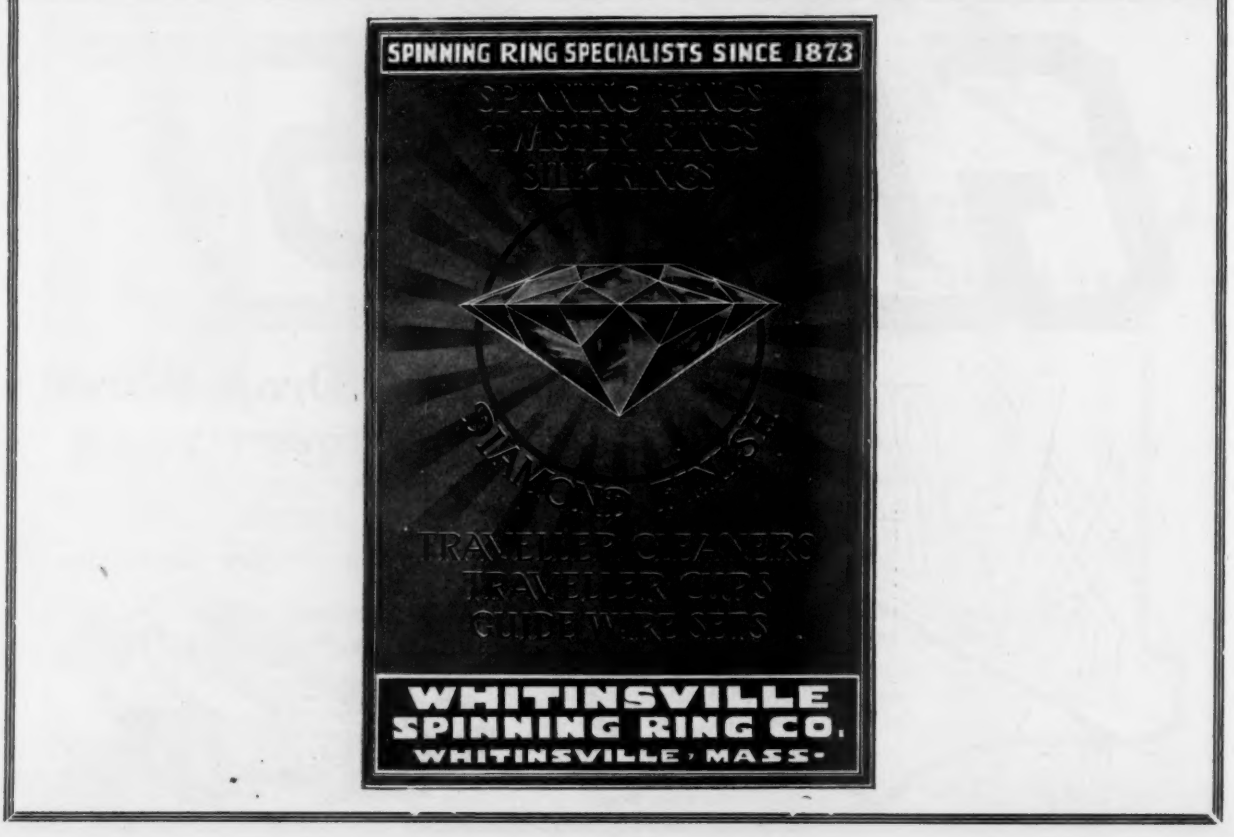
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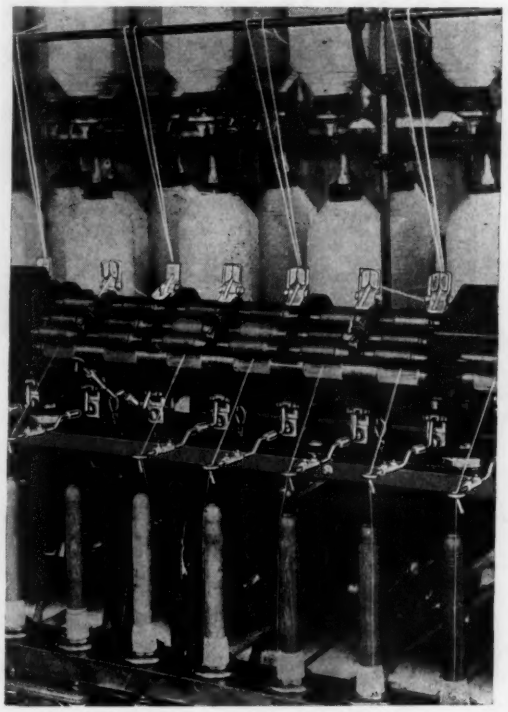
MAKES YARN instead of Lap Stick Waste



The Eclipse Automatic Stop-Motion absolutely prevents lap stick waste, also increases the operative efficiency.

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No. 292, best grade China bristle, peg construction, brush part 6-in long, set close and compact; solid hardwood, natural finish handle, 14-in. long. Gross ---------- **$60.00**

Every brush that leaves our factory carries with it our rigid guarantee of absolute satisfaction or the brushes may be returned at our expense.

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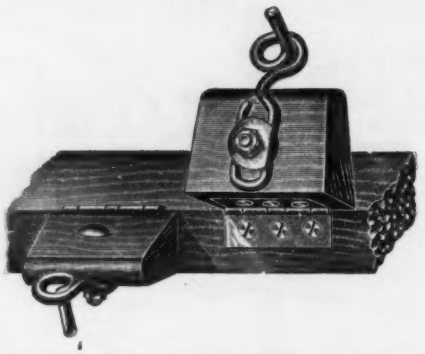

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The Box Truck
that exactly fits textile mill uses

All direct and indirect handling economies are enjoyed by the many leading mills that use Lewis Box Trucks, Transfer Trucks and Baskets.

Built to last ten years and longer—light in weight—pilfer proof—supplied with detachable and washable canvas liners—fitted with thread guard casters—shipped KD—manufactured in large quantities and priced accordingly.

We have never failed to save the mill money when a textile handling problem was put to us. Lay your problem before us and we will gladly offer suggestions. Write today for the Lewis "Bulletin on Trucking in Textile Mills."

LEWIS
Box Trucks
G. B. LEWIS COMPANY
BOX TRUCK DIVISION (C-11)
WATERTOWN, WISCONSIN

John Cronin, 13 Hamilton St., Boston 25, Mass.; Mill Specialties Co. 439 Arch St., Philadelphia, Pa.; W. Gracey, 230 Broad St., Spring City, Pa.; E. C. Buehrer Co., 18 Front St., San Francisco, Cal.; J. D. Collins Sales Co., 927 Grant Bldg., Atlanta, Ga.; R. E. Stanton Equipment Co. 615 Ryan Annex, St. Paul, Minn.; R. R. Street & Co., Inc., 28 N. Clinton St., Chicago, Ill.; Edw. L. Koehnig Co., 23 W. Kinzie St., Chicago, Ill.—Detroit address—Ryerson Bldg., Milwaukee address—114 Grand Ave.; Alvin Lovingood Co., 14 Walker St., Atlanta, Ga.

EIGHTY THOUSAND

Automatic looms of all types, including plain looms made automatic, from Maine to Louisiana, now use and endorse the

CLAYTON & BENTLEY
IMPROVED AUTOMATIC
THIN-PLACE PREVENTERS

as the most economical and positive relief from Thin Places available. All interested mills are offered the opportunity of proving the merits of this appliance in their own mills, by testing samples, without expense or any sort of obligation. Simple permission to have an Erector call and equip a few looms for as long a test as you desire is all that we solicit, as the device does its own talking.

Our sales in 1921 exceeded any previous year. The appliance quickly pays for itself—thousands of our first models have been in constant use eight to ten years—have paid for themselves many times over—are still good for many years to come—the upkeep expense being just about NOTHING NET.

Manufactured by

CLAYTON & BENTLEY CO.
88 Stonewall Street, Atlanta, Georgia.

A Comparison of Drinking Fountain Streams

Vertical Stream Bubbler Condemned Everywhere — *Camouflaged Vertical Stream* — *Rainbow Stream, Hose-like difficult to drink from*

No. 1 shows the vertical stream which permits saliva and waste water from the drinker's mouth to fall back to the source of supply. No longer considered sanitary.

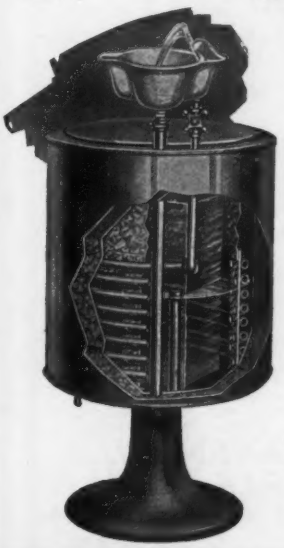
No. 2 is a slight modification of vertical stream type. This slight angle is little if any improvement over No. 1.

No. 3 is more sanitary if properly used. But stream is hose-like with no definite drinking point. Drinker places mouth as near water outlet as possible. Unsanitary like Nos. 1 and 2.

The Puritan Cantonment "Mound Building" Stream

Practical drinking mound is formed by mechanical means. Interference is set up in stream which retards water movement at the apex of arc. This stream makes it impractical to drink from any other point. Approved by U. S. Government. Now recognized by largest interests and schools in the country.

—Definite Drinking Point.
—Sanitary and Practical.



Puritan CANTONMENT DRINKING FOUNTAINS

Puritan "Cantonment" Coolers are designed to connect to pressure lines and are so constructed that the drinking water does not come in direct contact with either the ice or ice water, but is circulated through brass coil which is tinned both inside and outside.

With 2-stream "Mound Building" Projector this cooler is the most efficient and sanitary of its kind on the market.

WRITE FOR ILLUSTRATED LITERATURE NOW.

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Warren, :: :: :: Ohio

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AT THE

CONVENTION and EXHIBIT

OF THE

National Association of Hosiery and Underwear Manufacturers

PHILADELPHIA, MAY 22, 23, 24, 25, 26

Exhibition at Commercial Museum
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BUSINESS FROM THE START

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We recommend Fibre Re-inforced for longer service—better weaving.

BROWN & SHARPE

Milling Machine—Automatic Gear Cutting Machines and Machinists' tools. There are none better.

HENDEY

Lathes, Shapers.
Two tools that you should have in your machine shop. Recognized everywhere as the best to be had.

When in the market for Textile Supplies, or Machine Shop Equipment, let us quote you on your requirements. We represent the leading manufacturers, and you will find our service unsurpassed.

THE WALRAVEN CO.
Machinery and Mill Supplies
36-38 W. ALABAMA ST. ATLANTA, GA.

***Kleradesk*—your present system—plus**

The Kleradesk adapts itself to your peculiar requirements—combining both horizontal and vertical handling of desk papers.

Sorts and routes departmental mail; holds reference papers out of way but immediately at hand when needed. Saves time. Efficient. Convenient.

A Steel Sectional Device

Add compartments as required. Vertical sections $1.20 each. Four-compartment combination illustrated below $6.65. Indexed front and back. Write for free, instructive, illustrated folder, "How to Get Greater Desk Efficiency."

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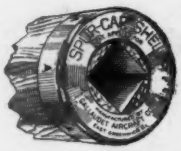

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Made to Stand the Hard Knocks

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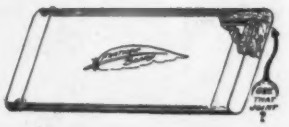
Pat. Applied for

FEATHERBOARD

The Master Cloth Reel



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MASON'S Whip Hoists

— WOOL—AND—COTTON—

OUTRIGGER SERVICE AND HATCHWAYS
HOISTS 25 TO 50 BALES PER HOUR

———IN USE AT———

MILLS, DOCKS, WAREHOUSES, HAY DEPOTS, ETC.

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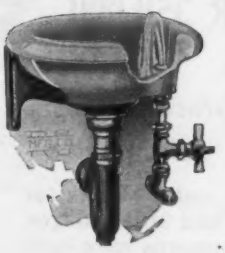
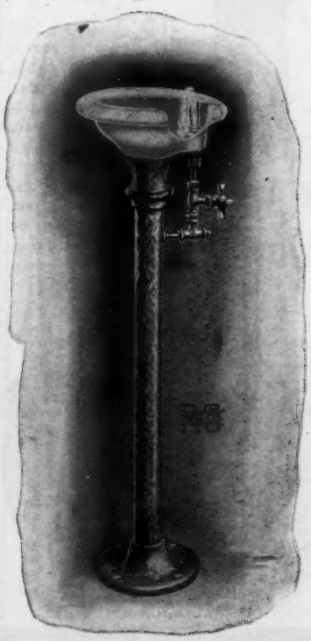
FRICTION PULLEYS AND CLUTCHES

ONE ROPE CONTROLS, HOISTS, LOWERS AND HOLDS THE LOAD

The Last Word
IN
Sanitary
Drinking Fountains





"Vertico-Slant"
Stream Fountains

are in accord with science, embodying the copious drinking feature of the vertical stream, yet the stream is at such a slant as to eliminate the danger of contamination by germ-laden water falling back to the nozzle. The lips cannot touch the nozzle as it is located slightly above the sloping base of recess.

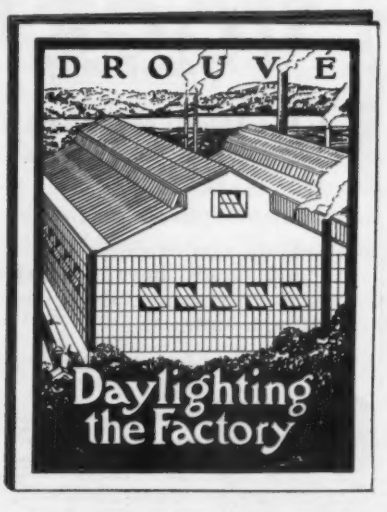
"Vertico-Slant" Stream Fountains are the last word in sanitary drinking fountains.

For mills, schools, mill villages, club rooms, etc.

Write for circular giving full details.

Rundle-Spence Mfg. Company

MILWAUKEE, WIS.



Look Into It!

Perfect lighting of the mill interior is today, more than ever, an economic necessity, and of all lighting, natural daylight is the best and cheapest.

If you are contemplating changes in your mill, new additions or a new mill construction, look into the matter of skylights. This interesting booklet tells how skylight roofs can be made as substantial as any other roofs, how glass breakage has been eliminated and corrosion prevented, how better lighting and more perfect ventilation is assured, illustrating many installations, and containing other data of value to the mill man.

A copy should be in every mill man's file. Write for your free copy today.

THE G. DROUVE CO.

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Attractive Opportunity For Live Sales Agents

Let Us Save You Money On
Window Guards, Skylight Guards, Factory Guards, Factory Fence, Factory Gates, etc.

All You Need

is a Wrench

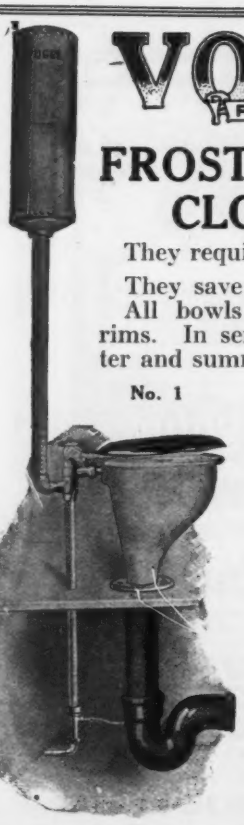
The extreme ease with which they can be erected, moved, changed to suit conditions, and adjusted to any space requirements, explains the growing demand for

Knapp Standard Wire Partitions

No fitting, cutting, drilling or extra material required—you just put it together. Standard panels include gravity doors, swing doors, wickets, etc., ready to erect.

Send sketch or dimensions for complete details and prices.

KNAPP FENCE **THE KNAPP FENCE CO., E. 134th St., CLEVELAND, OHIO.** KNAPP FENCE



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PATENTED

FROST PROOF CLOSETS

They require no pit.

They save water.

All bowls have enameled rims. In service daily, winter and summer.

No. 1

OVER 350,000
Giving
Satisfaction in All Climates

The ideal water closets for Factories and Mill Villages, where thousands have been installed.

The most durable water closets made — excepting none.

Every Fixture Tested Under Hydraulic Pressure Before Leaving Factory.

INSIST ON GETTING THE VOGEL

Ask your jobber

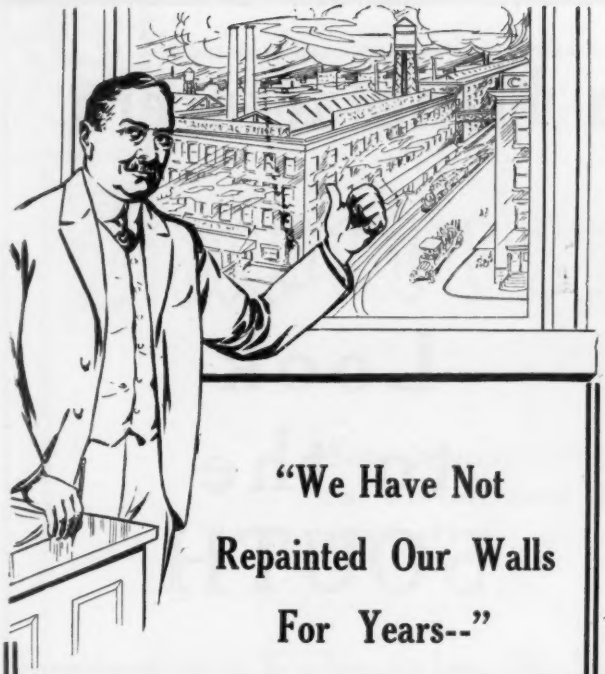
JOSEPH A. VOGEL CO.

Factory and Office at
WILMINGTON, DEL.

VOGEL
PATENTED

No. 5 FACTORY CLOSET

This fixture fills the demand for a strong and durable automatic water saving closet outfit for factory use. The valve device is extremely simple and repairs, though seldom necessary, can be made by removing the valve cap back of bowl.



"We Have Not Repainted Our Walls For Years--"

AND THEY'RE STILL WHITE

ZEMCOLITE—the Cement Paint—is the permanent mill white. Paint your walls with ZEMCOLITE now, and for years to come they will remain white because ZEMCOLITE is not only the best paint for permanent wear, but its economy is readily appreciable. ZEMCOLITE is a compound of PURE WHITE Portland Cement reprocessed with suitable minerals, and put up in dry powder form. It is to be mixed with water instead of oil. It makes a weather-proof, fire-resisting and sanitary coating.

Zemco-lite

TRADE MARK

"The Cement Paint"

is the ideal paint for mill interiors, brick, concrete or plastered surfaces, or repainting frame or brick buildings. ZEMCOLITE is also furnished in varied attractive colors for mill village home painting. Think of the saving effected when quality and permanence, together with less expense, are considered.

Write us for full information.

American Cement Paint Co.
Chattanooga, Tennessee

CYCLONE HOISTS

HIGH SPEED

More Lift Per Pound Pull!

The Gyrating yoke, a patented mechanical improvement found exclusively in Cyclone Hoists, keeps two-thirds of its teeth in constant contact with the teeth of the large load chain gear. That means a surer, more powerful drive with remarkably low frictional losses and practically no vibration. Roller bearings (another C. M. hoist improvement) insures smooth action, a faster, easier lift, and *longer life.*

Catalog completely descriptive of our hoists, cranes and trolleys will be mailed on your request

The Chisholm-Moore Mfg. Co.
Cleveland, Ohio

Hoists	Cranes	Trolleys
New York	Chicago	Pittsburgh

Northern Cotton Manufacturers

vessels by offi... of the ...overn...
traveling abroad."

TURNING TO THE SOUTH.

New England Cotton Manufacturers Aware of Keen Competition There.

The South is improving every year in the manufacture of fine cotton goods, according to G. S. F. McCready of Winchester, Ky., who has arrived at the Majestic. He says that as a result of this advancement the manufacturers in New England, the stronghold of the textile industry, are beginning to give attention to the advantages offered their business below the Mason and Dixon line.

"Until a few years ago," said Mr. McCready, "Greenville, S. C., and Queensboro, N. C., were the only centres in the South where cotton goods were manufactured which could compete in quality with the products of Northern mills. But now there are so many mills throughout the South turning out high-grade material, and turning it out so cheaply that the New England manufacturers are beginning to investigate.

"One of the biggest cotton manufacturers in New England, a man who controls a chain of mills in Massachusetts, has just completed a survey of the Southern field with a view to beginning operations there. He has found that the South has plenty of water power, skilled labor and cheaper living conditions than in the North. And what is still more important, the cotton manufacturer in the South, being right at the source of his raw material, is practically free from freight rates."

Mr. McCready said that about 8,000,000 bales of cotton were produced in 1921, a sub-normal crop but, with the carry-over from 1920, sufficient to meet all demands this year. No great demand is anticipated, he said, until Europe is again in a position to buy.

New York Times
February 5, 1922

Look to the SOUTH

SOUTHERN COTTON MILL SITES AVAILABLE

The Central of Georgia Railway runs through the heart of the Cotton Belt. Many advantageous sites for cotton mills are available. Plenty of good labor; abundant power and shipping facilities unexcelled. We can be of material assistance to you in locating your new mill. Our industrial department is always at your service.

J. M. MALLORY, Industrial Agent

Central of Georgia Railway Company

Savannah - - Georgia

Cannot Shrink Under Any Condition

Fabreeka Belting

Submit your belting requirements to us, we can meet them to your entire satisfaction.

Fabreeka Belting Company

30 India Street **Boston, Mass.**

ONLY A FEW DROPS OF OIL
FOR SAFETY

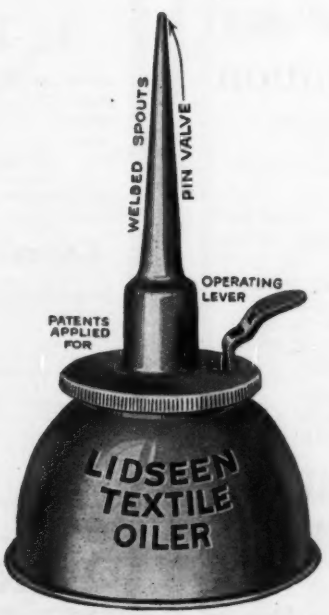
Remove from the hands of your workman the old-fashioned hit or miss oil dripping, oil wasting, time consuming oil can and replace with this wonderful

OIL DROPPING OILER

You can
SAVE OIL
SAVE GOODS
SAVE TIME

Ask

MR. J. S. HULME
Atlanta Trust Bldg.,
ATLANTA, GA.
Southern Representative



½ Pt. 4" Spout

This oiler is most wonderful in its operation. So set as to only emit a few drops of oil and no more. The pin head valve prevents leaking from end of spout.

This oiler was
MADE FOR THE TEXTILE INDUSTRY

You can
SAVE MONEY
SAVE WORRY
SAVE CUSTOMERS
IT'S A
***LIDSEEN* PRODUCT**
832-840 So. Central Ave.
CHICAGO.

THE
"Southwestern Iron Clad"
Is the IDEAL Cotton Mill Broom

Only the best grade of broom corn is used in these brooms—they are built strong and will withstand the hardest usage.

The light weight, yet strong and substantial shields used gives the broom ample protection and at the same time allows the proper amount of broom corn to be used, thus giving them excellent sweeping qualities.

MADE RIGHT!
PRICED RIGHT!

Inquiries and orders receive prompt attention.
Sold direct and through
all principal distributors.

The Southwestern Broom Mfg. Co.
Evansville, Indiana

Don't Stretch Your Warps on the Slashers!

Stretched, lifeless warps mean poor weaving and less production.

Ball-bearing-equipped truck rollers can be applied to your slashers in an hour without taking the yarn off.

The cylinders will then turn freely, and there will be no danger of stretching the warp.

The cost is very reasonable, and the bearings soon pay for themselves in better slashing.

AldricH MachinE
Ball WorkS Bearings
Greenwood, S. C.

CRESSON-MORRIS CO.

POWER TRANSMITTING MACHINERY
Merit Plus Recognition

"The heights by great men reached and kept were not attained by sudden flight."

Time, skill and effort must also precede merit as surely in machinery as in men.

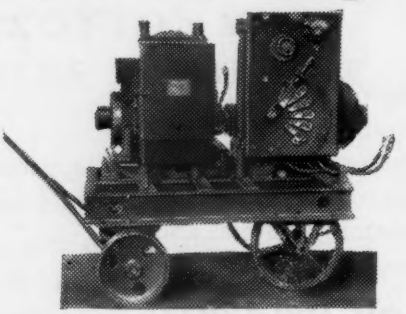
Time, skill and effort must also precede merit in order to obtain and maintain for merit the recognition it deserves.

The great number of large installations of Cresson-Morris Power Transmitting Machinery is proof of both the merit and the recognition of the merit that nearly three score years of skill and effort have endowed it with.

The cumulative knowledge of all this experience is always available to you in the recommendations of our engineers.

CRESSON-MORRIS COMPANY
ENGINEERS—FOUNDERS—MAHINISTS
PHILADELPHIA, PENNA
Branch Office. 141 Milk St., Boston, Mass.

G-E Arc Welding Set



Don't Junk Broken Parts

The cost of welding broken machinery parts is very low in comparison with the cost of purchasing new parts or new machines.

The electric arc method of welding is a great success and the G. E. Electric Arc Welding Machine is complete and convenient—thorough in every sense of the word.

If you have a welding job of any kind that is too large or intricate for your own mechanic, remember that you can obtain quick service and highest quality work from us.

We now carry a full stock of all oxy-acetylene supplies. Welding torches, latest improved—Something New.

We are ready with service and quality that will please you.

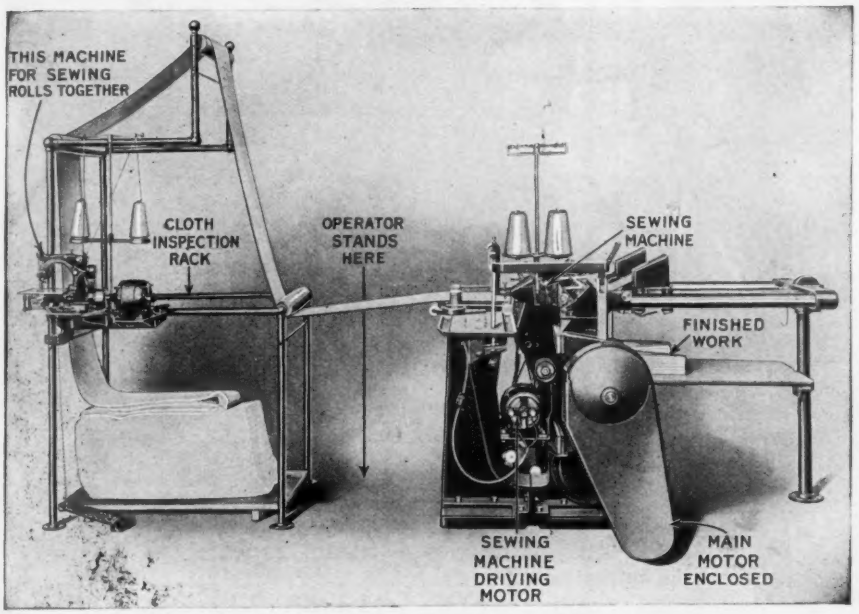
Write us for full information and prices.

George Bird Bruce Potts
WELDING ENGINEERS
BIRD-POTTS CO.
WELDING Incorporated BUILDING
376-378 MARIETTA ST., ATLANTA, GA.

THE JOHNSON FRICTION CLUTCH

in a No. 2 SINGLE SIZE is used on the Main Motor drive shaft Enclosed, of

THE WEIS AUTOMATIC DESIGN CUTTING AND SEWING MACHINE



COURTESY METROPOLITAN SEWING MACHINE CORP., NYACK, N. Y.

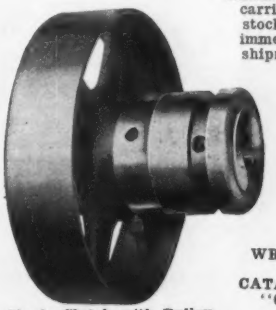
"We intend to use them right along—as they have proven very satisfactory."

Statements like the above coming from the Metropolitan Sewing Machine Corp. proves that the JOHNSON FRICTION CLUTCH is especially adapted to Textile Machinery.

Smooth exterior prevents accidents. Smooth in its operation—no jerk or jar in starting. Small and compact—requires very little space.

THE JOHNSON FRICTION CLUTCH will improve the "Friction Control" on any textile machine. Try one to prove it.

Standard sizes carried in stock for immediate shipment.



Single Clutch with Pulley

WRITE FOR CATALOG "G."

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN.

REG. U.S. PAT. OFF. TRADE JENKINS MARK Jenkins Bros

STRENGTH

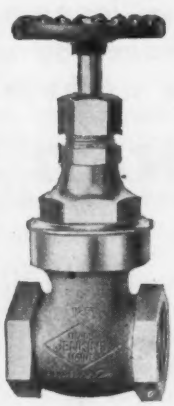


Fig. 370, Jenkins Standard Brass Gate Valve, screwed

Jenkins Gate Valves with their extra weight and strength stand the strains of expansion and contraction of piping, and thus prevent seat distortion, a common fault with cheap, lightly constructed valves.
Full unobstructed opening.
Solid wedge, double faced type that eliminates use of complicated levers and internal wedging devices.
Standard, medium, extra heavy patterns.
Know genuine Jenkins Valves by the signature and Jenkins "Diamond" cast on the body. Supply houses everywhere.

JENKINS BROS.
New York Boston Philadelphia
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Jenkins Valves
SINCE 1864

General Electric

Distributing Jobbers

Complete lines of Wire, Switches, Safety Switches, Wiring Devices, Fuses, Edison Mazda Lamps and other electrical materials carried in our Atlanta and Savannah warehouses ready for immediate shipment.

Quick Service

Carter Electric Co.

(WHOLESALE)

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PROMPT DELIVERY
99.5 PURE

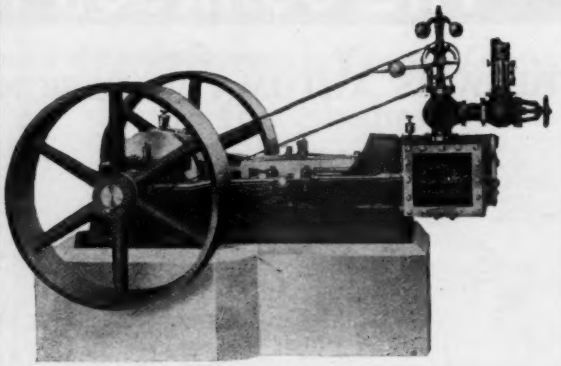
WE have cut the cost of welding to our customers to the minimum by installing oxygen supply stations at convenient points over the South. These stations can ship oxygen to you on short notice and being located near you the freight cost is negligible.

Perfection and economy in welding depends on the purity of the oxygen. When you use STANDARD OXYGEN you are reducing your welding costs to the minimum, for STANDARD Oxygen is 99¼% pure—the best that can be bought.

STANDARD is the first company in the South to manufacture oxygen, and satisfaction is insured by prompt shipments, full measure and absolute purity of oxygen. This satisfaction is attested to by the fact that our business has increased over 800% in the last two years.

There's a service station located near you. Write the one nearest you.

STANDARD GAS PRODUCTS CO., INC.
ATLANTA
CHATTANOOGA, GRETNA, LA.

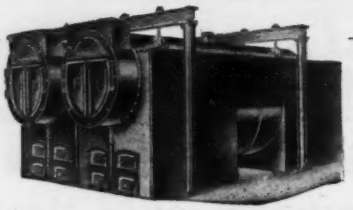


J. S. Schofield's Sons Co.
Macon, Georgia

MANUFACTURERS OF

High Pressure Return Tubular Boilers, High Grade Stationary Steam Engines, Tanks, Stacks, Stand Pipes.

Heavy Castings and Wrought Iron Works.



The Result of a Quarter Century Experience

These years of experience and study together with exhaustive tests and improvements, has enabled us to build modern boilers that are second to none—in design, construction, high efficiency and capacity, economical operation, and low cost for upkeep.

Made in several types. White us today and let us send you full data and reasons why the W & W BOILER will best meet your requirements.

The Walsh & Weidner Boiler Co.

CHATTANOOGA, TENN.

WALSH & WEIDNER
TUBULAR WATER TUBE **BOILERS**

Hotel Sinton

Where commodious lounging accommodations make you as comfortable as at home

CINCINNATI

700 ROOMS 700 BATHS 700 SERVIDORS

MODERATE TARIFFS

Write for Booklet on Cincinnati and The Hotel Sinton. We will also send Mail Order price list of the Famous Hotel Sinton Louis XVI Candies.

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The Recognized Standards of Quality

COTTON YARNS

Gray Manufacturing Co.
Arrow Mills, Inc.
Parkdale Mills, Inc.
Flint Manufacturing Co.
Arkray Mills, Inc.
Arlington Cotton Mills
Myrtle Mills, Inc.

Our Fine Yarns Make Fine Fabrics

The manufacturers of a number of America's well known textile products can vouch for the strength, uniformity, cleanliness and better weaving and knitting qualities of our yarns.

The yarns we spin for knitting, weaving, laces and converting, are furnished in all twists on skeins, cones, tubes and warps:

30s to 80s Single and Ply Combed Peeler Right Twist. 30's to 50's Single and Ply Double Carded Peeler, Right or Reverse Twist.

20s to 60s, 2, 3, and 4 Ply, Combed Peeler, Reverse Twist.

Our products are sold direct and exclusively through our General Sales Offices:
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MANUFACTURERS OF

Cotton Mercerized Tapes, Spool Tapes, Bindings and Narrow Fabrics for Underwear and other Trades.

WOODWARD, BALDWIN & CO.

DRY GOODS

Commission Merchants

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IMPORTER AND COMMISSION MERCHANT

LINEN YARNS

For Weaving, Knitting and all Purposes.

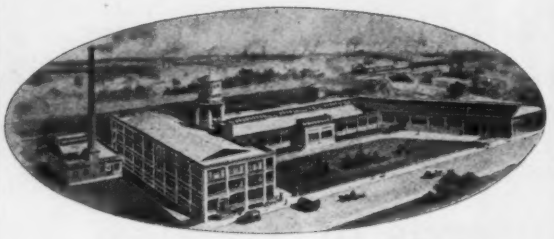
TURKEY RED YARNS

For Towel Borders, Towellings and Bleaching Cloth

Linen Jacquard Harness Twine

And Every Description of Linen Thread and Twine

115 Franklin Street, : NEW YORK



View of our Mercerizing and Bleaching Plant

BOGER & CRAWFORD

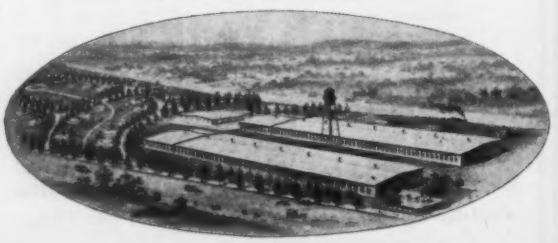
Established 1908

Spinners, Bleachers and Mercerizers of High Grade Combed Yarns

By using our Spinning and Mercerizing you are always assured of a standard product

"From the Cotton Field Direct to You"

Main Office, Factory and Warehouse
J and East Venango Sts., PHILADELPHIA



Spinning Mills, Lincolnton, N. C.

ESTABLISHED 1872

H. & B. BEER

NEW ORLEANS

HENRY BEER — EDGAR H. BRIGHT
J. WILLIAM BARKDULL — C. MORGAN ABRAMS

MEMBERS OF

New Orleans Cotton Exchange
New Orleans Future Brokers Association
New York Stock Exchange
New York Cotton Exchange
New York Coffee Exchange
New York Produce Exchange
Chicago Board of Trade

Associate Members of the Liverpool Cotton Association

Private Wires to Principal Points

The American Audit Co.

F. W. LAFRENTZ, C. P. A., Pres. — Telephone Ivy 869
H. M. RICE, C. P. A., Vice-Pres. — Cable Address
A. F. LAFRENTZ, Secy. & Treas. — Amdit, New York

NEW YORK—100 Broadway (Home Office).
33rd St. and 5th Ave., Waldorf-Astoria.
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Specialties in Cost Systems and Manufacturing Accounts.

C. B. BIDWELL, P. A., Resident Vice-President

CARVER-BEAVER YARN CO.

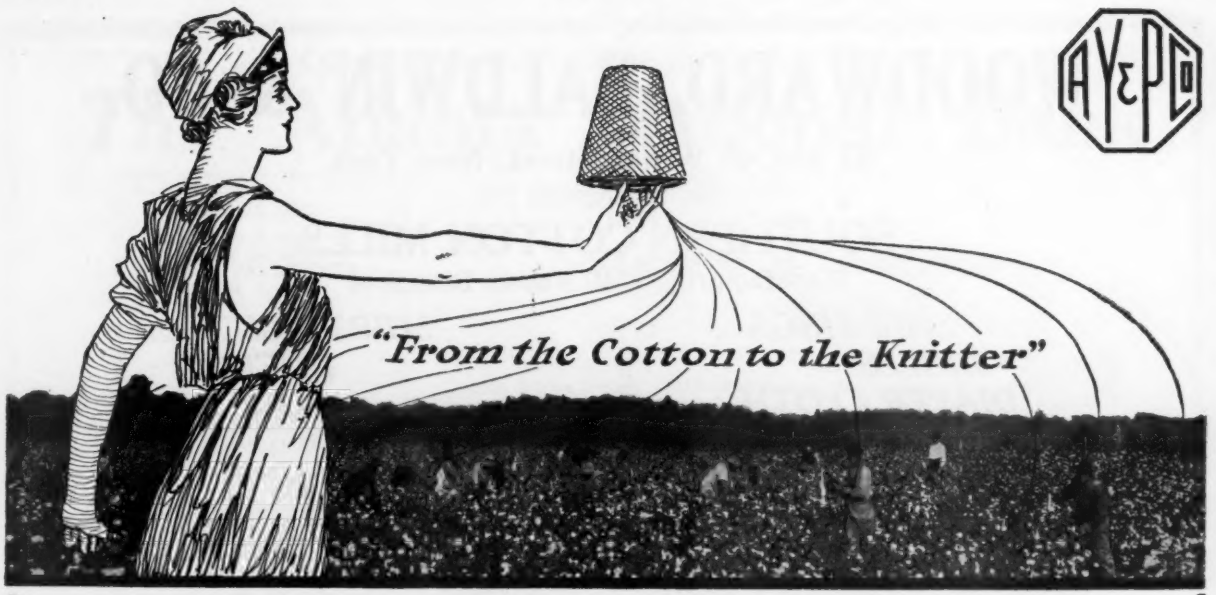
Successors to A. D. SALKELD & BRO., Inc.

ALL NUMBERS COTTON MERINO **YARNS** ALL COLORS WOOL WORSTED

366 BROADWAY, NEW YORK

ADVERTISING

is an economy and cuts the cost of selling, making lower prices or better goods possible without sacrifice of the sellers' profits.



AY&PCo

AMERICAN YARN & PROCESSING CO.

MOUNT HOLLY, N. C.

SPINNERS AND MERCERIZERS

HIGH GRADE COMBED AND CARDED YARNS—16s to 80s

Our Mercerized Yarns Are the Product of Our Own Mills

General Office, Mt. Holly, N. C. **Branch Office, 1111 James Bldg., Chattanooga, Tenn.**

Representatives

H. B. ROBIE, 346 Broadway, New York City **FORREST BROS., Forrest Bldg., Philadelphia**

WEIMAR BROTHERS

MANUFACTURERS OF

TAPES, BINDINGS AND NARROW FABRICS

2046-48 Amber Street

PHILADELPHIA

WOODWARD, BALDWIN & CO.

43 and 45 Worth Street, New York
Selling Agents for
SOUTHERN COTTON MILLS
Manufacturing Well Known Brands of

SHEETINGS ***SHIRTINGS***
DRILLS ***DUCKS***
DIAPER CLOTH ***TOWELS***

For Home and Export

ALL WEIGHTS AND CONSTRUCTIONS OF PRINT CLOTHS AND FINE CLOTHS IN PLAIN AND FANCY WEAVES.

Outing Flannel and Romper Cloths
Towels and Diaper Cloths

Baltimore **Philadelphia** **Boston**
St. Louis **San Francisco** **Chicago**
St. Joseph **Shanghai, China**

J. H. LANE & CO.

334 Fourth Avenue
NEW YORK

Selling Agents for
Cotton Mill Products

BOSTON CHICAGO

1865 **Oldest National Bank in the Cotton States** 1922

The Atlanta National Bank

Atlanta, Ga.

ESTABLISHED 1865

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President

VICE PRESIDENTS
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Geo. R. Donovan
Thos. J. Peeples

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R. B. Cunningham
Jas. F. Alexander
Leo Stillman
A. N. Anderson
J. S. KENNEDY, Cashier

DIRECTORS
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R. F. Maddox
Albert E. Thornton
E. H. Inman
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Alfred Austell
S. C. Dobbs
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J. T. Holleman
Lloyd B. Parks
J. Epps Brown
Dr. W. S. Elkin
Wm. J. Davis
H. R. Durand
S. Y. Tupper.

Statement of Condition

(Condensed) March 10th, 1922

RESOURCES

Loans and Discounts	$16,604,842.65
United States Bonds and Certificates	1,842,402.35
Other Bonds and Stocks	45,999.90
Stock in Federal Reserve Bank	75,000.00
Banking House	800,000.00
Real Estate	118,020.00
Cash on Hand, Due from Banks and U. S. Treasurer	5,535,658.86
	$25,021,923.76

LIABILITIES

Capital Stock	$ 1,000,000.00
Surplus and Undivided Profits	1,938,414.08
Reserved for Taxes and Interest	265,000.00
Circulation	945,600.00
Deposits	20,872,909.68
	$25,021,923.76

The Atlanta National Bank

Active Designated Depository United States Government,
State of Georgia, County of Fulton and City of Atlanta

L. B. GOFF, *President* B. C. CHACE, *General Manager* E. E. LEONARD, *Treasurer*
K. F. WOOD, *Vice-Pres.* S. E. JACKSON, *Asst. Treas.*

Crown Manufacturing Company

Pawtucket Rhode Island

Special Qualities in Combed Cotton Yarns

60,000 Spinning Spindles

Single and Ply for All Purposes from American, Egyptian and Sakelaridis Cottons

13,600 Twister Spindles

THE AMERICAN AUDIT COMPANY

100 BROADWAY, NEW YORK CITY

F. W. LAFRENTZ, C. P. A., President.

H. M. RICE, C. P. A., Vice Pres. A. F. LAFRENTZ, Secy. & Treas.

BRANCHES:

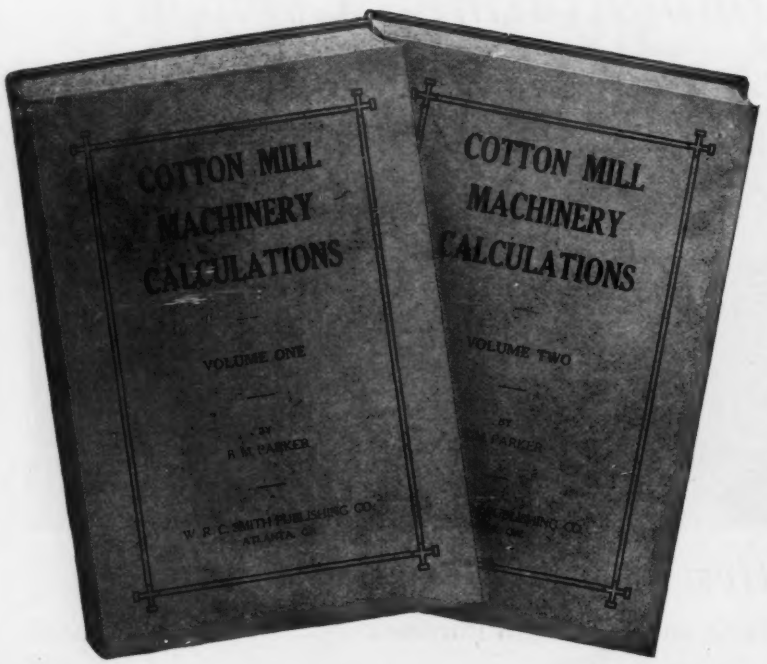
New York	Baltimore	New Orleans	Philadelphia
Richmond	Milwaukee	Scranton	Wilkes-Barre
Washington, D. C.	Atlanta	Boston	Los Angeles
Chicago			London, E. C.

Our Reports of Audits and Our Certificates of Condition and Operations, Are Known and Have Weight in the Financial Centers of the World

ATLANTA BRANCH

1013 Fourth National Bank Building, Atlanta, Ga.

C. B. BIDWELL, C. P. A., Resident Vice President.



EVERY Textile Man should have these reference books. They cover in a detailed and thorough manner all calculations necessary to be made on any cotton mill machinery manufactured in the United States and constitute one of the best references on this subject obtainable.

The two volumes are illustrated with 45 diagrams and contain 21 reference tables.

As the value of a book lies in its contents and not in a fancy cover, we have put these two volumes out in a strong, serviceable paper binding. You can secure them in conjunction with a subscription to COTTON.

Write for circulars and full information.

A Matter of Economy

The MARTINIQUE

IS GLAD TO ANNOUNCE REDUCED RATES

SOMEONE must take the initiative in making it possible for people to travel and spend less money—now that there is less money to spend.

So, hand in hand with Hotel McAlpin which recently announced its reductions, the Martinique—just across the street and under the same management—becomes a leader in lowering hotel tariff.

This is setting an advance style, as it were, for there has not been an appreciable reduction in the cost of running a large New York hotel.

If, however, the public esteems the spirit in which it is done, as much as the management of the McAlpin and Martinique appreciates its patronage, then indeed, is it worth doing.

At the Martinique the new prices are: $3.50 up for rooms and bath; $2.50 for room without bath.

The
MARTINIQUE
Broadway, at 32nd St., New York
Frank E. Jago, Resident Manager

ATLANTA'S NEW MILLION DOLLAR HOTEL
POPULAR PRICED
HOTEL CECIL
COFFEE SHOP—ROOF GARDEN

312 ROOMS—FIRE PROOF—312 BATHS
RATES PER DAY, EUROPEAN PLAN

	ONE PERSON	TWO PERSONS
22 ROOMS AND BATH	$1.50	
104 ROOMS AND BATH	2.00	$3.00
104 ROOMS AND BATH	2.50	4.00
53 ROOMS AND BATH	3.00	5.00
14 ROOMS AND BATH	4.00	6.00
8 ROOMS AND BATH TWIN BEDS		5.00
7 ROOMS AND BATH TWIN BEDS		7.00

H. R. and C. R. CANNON, Proprietors
J. F. deJARNETTE, Manager
OPERATING
GEORGIAN HOTEL, ATHENS, GA. TERMINAL HOTEL, ATLANTA, GA.

WHEN YOU GO TO SAINT LOUIS
STOP AT
Hotel Claridge
Locust Street at 18th
Three Blocks from Union Station
New 12 Story Fireproof Building

Finest Transient and Residential Hotel in St. Louis. In the heart of the Wholesale and Retail Shopping District. 350 Large, Light, Airy Rooms; Private Tub Bath in each Room. Circulating Ice Water and Every Modern Appointment of Comfort and Convenience.

European Plan—Rates

75 Rooms at $2.50 a day
100 Rooms at $3.00 a day
100 Rooms at $3.50 a day
75 Rooms at $4.00 a day

Excellent Cuisine, Moderate Priced Restaurant, Popular Cafeteria. Write or Wire for Reservations.

R. L. MEYER, *Manager*
Formerly Hotel Statler

4-70

EUROPEAN PLAN
600 ROOMS - 600 BATHS
Headquarters in Detroit for
Old Colony Club Detroit Automobile Club
Detroit Transportation Club

100 at $2.50 Single — $4.50 Double, per Day
150 " $3.00 " — $5.00 " " "
100 " $4.00 " — $6.00 " " "
50 " $5.00 " — $7.00 " " "
50 with Twin Beds, $5.00 to $7.00 " "
100 In Suite, $5.00 to $8.00, Double " "

2 Floors Agents Sample Rooms, $5 per Day

Table d'Hote Dinner $1.00-$1.50
Business Men's Lunch 75c

HOTEL TULLER
CAFETERIA A. McKENDRICK, Mgr. GRILLE

CLASSIFIED ADVERTISING

New and Second Hand

ENGINES

Corliss Automatic and Slide Valve

BOILERS

Pumps, Hoisting Engines, Gas and Gasoline Engines.

MACHINE TOOLS

Lathes, Planers, Shapers, Drill Presses, etc.

WOOD WORKING

Planers, Molders, Band Saws, etc.

ELEC. MACHINERY

Dynamos and Motors
AND SUPPLIES OF ALL KINDS

FRANK TOOMEY, Inc.,
127-31 N. Third St.
Philadelphia, - Pennsylvania

RATES:

DISPLAYED.

"For Sale" and all other advertisements using bold-face type or otherwise displayed, $2.00 per inch per insertion.

Rates for larger spaces furnished on application.

WITHOUT DISPLAY.

"Positions Wanted" 3 cents per word per insertion. Minimum charge 50 cents. Payable in advance.

"Positions Open" and other undisplayed advertisements, 4 cents per word per insertion. Minimum charge $1.00. Payable in advance.

(When replies are to be received in our care, allow four words for box address.)

Salesman Wanted

Salesman acquainted with buyers and who can obtain orders for sales and order books, can make favorable commission arrangements with leading Chicago concern in this line. Chicago Sales Book Co., 337 W. Madison St., Chicago.

LAUNDRY MACHINERY.

Complete equipment made by the American Laundry Machinery Co. New—never been uncrated.

Will Sell Cheap.

SUMMERVILLE COTTON MILLS
SUMMERVILLE, GA.

We Offer Subject to Being Unsold the Following:

50 H. P. Motor—G. E.
1100 R.P.M.
High Speed
Cyc. 60
Volts 220
Amp. 120
Size of Pulley 12 in. Dia.
12 in. Face.
Starting box for same.
2 transformers.
75 Ft. wiring and switch.
Brand new; in use only 9 months.

Greensville Building Supplies Co.
North Emporia, Va.

NEW IDEA

Stop motion for Roving and Spinning. Prevents "Singles." Eliminates waste. Produces more and better yarn.

No More "Singles"
Lowell Textile Associates, Inc.
LOWELL, MASS.

Do You Want to Sell it?

Probably you, like many other mills, have some equipment or machinery which you have taken out, or are thinking of taking out and replacing with new equipment.

Why not dispose of this second-hand equipment at a profit? COTTON is read by thousands of Cotton Mills that are hardly touched by Northern journals.

You Can Sell Your Second-Hand Equipment

to these mills through advertising in the Classified Advertising Section of COTTON. Such advertising produces results at small cost—why not try it out and get that second-hand equipment off your hands in a profitable way? Tell us what you have for sale and let us insert an advertisement for you.

COTTON
Grant Bldg., Atlanta, Ga.

WANTED—Something to Sell.

American Machinery and Textile Appliance manufacturer of high standing, with long established branches in England and on the Continent, wants additional lines for foreign distribution through those branches.

Address Box 48, care COTTON, Atlanta, Ga.

FOR SALE

A COMPLETE PLANT OF 24 CROMPTON & KNOWLES 96 inch Jacquard Looms, now running on fine colored Mitcheline Bed Spreads, including beaming, winding, sewing and fringing machines. Owner retiring.
ADDRESS BOX 49, CARE OF "COTTON," ATLANTA, GA.

MACHINERY BARGAINS

for Textile Mills

The Nashville Industrial Corporation, purchasers of the $87,000,000 Old Hickory Powder Plant, has released a large amount of machinery for immediate sale, a large portion of which is very desirable for use in textile plants. None of this equipment was in use over 90 days, and while in practically new condition it is offered at second-hand prices.

Special Bulletins covering various kinds of equipment will be sent on request.

A few of the many offerings:

PUMPS.

8—14-in. Worthington Class B, double suction, 8500 G.P.M. at 152 ft. head, at 1170 R.P.M., direct connected to 300 hp. G.E., 3 phase, 60 cycle, 2200 volt motors.

4—14-in. Allis-Chalmers, Type S, 7500 G.P.M. at 130 ft. heat at 1760 R.P.M., direct connected to 300 h.p. General Electric, 3 phase, 60 cycle, 2200 volt motors.

2—10-in. Allis-Chalmers, Type S, 3750 G.P.M. at 130-ft. head at 1765 R.P.M., direct connected to 150 h.p. Westinghouse 3 phase, 60 cycle, 2200 volt motors.

6—16-in. Allis-Chalmers, Type S, 8500 G.P.M. at 90-ft. head, direct connected to Type L, 300 h.p., 2000 R.P.M. G.E. Curtis steam turbine.

6—14-in. Allis-Chalmers, Type S, 6500 G.P.M. at 150-ft. head, 8100 G.P.M. at 90-ft. head, direct connected to 300 h.p. 2000 R.P.M. G.E. Curtis steam turbine.

1—20 x 12 x 16 Worthington duplex Underwriters fire pump, 1500 G.P.M., 100 lb. pressure.

200—New and used simplex and duplex, steam driven, Worthington pumps, 4½x3¾x4, 5½x4¾x5, 6x4x6, 7½x4½x10, 6x2½x6.

100—New and used belted 2½", 3", 5", 5", and 6" centrifugal pumps.

Bulletin No. 8 gives complete specifications of all Pumps.

BLOWERS.

2—18-in. Type C. American Electric Exhaust Fans.
10—18-in Buffalo Electric Disc Exhaust Fans.
6—24-in. Buffalo Electric Disc Exhaust Fans, Emerson Motors.
28—24-in. Buffalo Electric Disc Exhaust Fans, E. S. C. Motors.
64—30-in. Buffalo Electric Disc Exhaust Fans, Emerson Motors.
18—30-in. Buffalo Electric Exhaust Fans, Sprague Motors.
5—No. 1 Buffalo Baby Conoidal Fans, Emerson Motors.
4—No. 2 Buffalo Baby Conoidal Fans, Emerson Motors.
4—No. 3 Buffalo Baby Conoidal Fans, Emerson Motors.
15—No. 4 Buffalo Baby Conoidal Fans, Emerson Motors.
All the above equipped with standard A.C. Motors.

BLOWERS—continued.

5—No. 3 Buffalo Niagara Conoidal Fans.
10—No. 4½ Buffalo Niagara Conoidal Fans.
25—No. 6 Buffalo Niagara Conoidal Fans.
15—No. 7 Buffalo Niagara Conoidal Fans.
1—No. 9 Buffalo Niagara Conoidal Fan.
10—No. 4 Buffalo "B" Volume Blowers.
5—No. 5 Buffalo "B" Volume Blowers.
2—No. 6 Buffalo "B" Volume Blowers.
5—No. 8 Buffalo "B" Volume Blowers.
10—No. 1 Low Pressure Gas Exhausters.
10—30-in. Buffalo Standard Reversible Mill Exhausters.
25—50-in. Buffalo Standard Reversible Mill Exhausters.
10—No. 4 24-in. Buffalo Steel Pressure Blowers.
7—Roots Style D, High Pressure Type Blowers, capacity 890 cu. ft. per minute.
2—Connersville Blowers, capacity 3,200 cu. ft. per minute.
Write for Bulletin No. 11 giving complete specifications.

TRANSMISSION.

Thousands of pulleys, including pressed steel, split cast iron and solid cast iron, ranging in diameter from 6 to 56 inches, and in width from 2 to 32 inches, are included with the material at Old Hickory.

Also hundreds of tons of cold rolled shafting up to six inches in diameter, pillow blocks, drop hangers, ring-oiling, capillary and standard bearings, flange couplings, ribbed couplings, grim death couplings, wall brackets, floor stands, pillow block frames, friction clutches, cut-off couplings, sleeves, collars, etc.

We can supply complete line shafts or any transmission equipment needed. Write for Bulletin No. 15.

TANKS.

1500—New and used steel Tanks, small sizes. Mixing tanks, storage tanks, boiling tanks, pressure tanks, and open tanks.
2000—Wood tanks. All sizes.
Hydro-Extractors, Cotton Washers and Dryers, Mixing Pickers, Rinsers, etc.
Electrical Supplies of all kinds.

Write for Catalogues.

NASHVILLE INDUSTRIAL CORPORATION

JACKSONVILLE, TENN.

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Commercial Acetylene Supply Co.
Oxweld Acetylene Co.
Standard Gas Products Co.

ACETYLENE WELDING APPARATUS.
(See Welding Apparatus.)

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American Audit Co.
Ernst & Ernst.

ACCOUNTING SYSTEMS.
Ernst & Ernst.

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Bayley Mfg. Co.
Buckeye Blower Co.
Carrier Eng. Corp.
Parks-Cramer Co.

AIR COMPRESSORS.
(See Compressors.)

AIR CONDITIONING SYSTEMS.
(See Humidifying Apparatus.)

ALBONE.
Roessler & Hasslacher Chemical Co.

ALKALIES.
(See Dyestuffs and Chemicals.)

ANILINE COLORS.
(See Dyestuffs and Chemicals.)

ANTI-CHLORINE.
(See Dyestuffs and Chemicals.)

ANTI-CHLORINE ACID GENERATOR.
Macomb Machine Co.

APPRAISAL SERVICE.
American Appraisal Co.

APRONS—RUB.
Bond Co., Chas.
Smith & Furbush Machine Co.

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Robert & Co.
Spiker & Lose
Sirrine, J. E.
Stuhrman, Edw. A.
Thompson & Binger, Inc.

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(See Coal Handling Machinery.)

ASPHALT SLATE SHINGLES.
(See Slate Asphalt Roofing.)

AUDITORS AND ACCOUNTANTS.
American Audit Co.
Ernst & Ernst.

AUTO TRUCKS.
(See Trucks—Auto.)

AUTOMATIC CONTROLLERS (TEMPERATURE).
(See Temperature Controllers.)

AUTOMATIC LOOM ATTACHMENTS.
(See Loom Attachments.)

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Hopedale Mfg. Co.
Lord Bros.
Proctor & Schwartz, Inc.
Saco Lowell Shops.
Sargent's Sons Corp., C. G.
Smith & Furbush Mch. Co.
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BALE OPENERS.
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Economy Baler Co.
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(See Presses.)

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Weimar Bros.

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Citizens & Southern Bank.
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BASKETS—MILL.
(See Boxes—Mill.

BATH CABINET—SHOWER.
Crane Co.
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(See Storage Batteries.)

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Warner Co.
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BEAM DYEING MACHINES.
Cocker Mchry. & Foundry Co.

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(See Warpers and Warping Machinery.)

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Hyatt Roller Bearing Co.
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Fabreeka Belting Co.
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Williams & Sons, I. B.

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Link-Belt Company.
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Columbia Novelty Mfg. Co.
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BELT LACING.
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American Water Softener Co.
Norwood Engineering Co.
Permutit Co.
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(See Grates and Stokers.)

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(See Banding Straps and Buckles.)

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Hightower Box & Tank Co.
Lewis Co., G. B.
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Walke Box Co.

BOXES—PACKING.
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(See Welding.)

BROKERS—COTTON.
(See Cotton Dealers & Brokers.)

BROKERS—STOCK.
(See Stocks and Bonds.)

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(See Brushes.)

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Harris Broom Co.
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Link-Belt Company

BUCKLES—COTTON TIE.
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(See Contractors.)

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Butterworth & Sons Co., H. W.
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(See Rolls—Calender.)

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Carter Electric Co.

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Whitin Machine Co.

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Smith & Furbush Mach. Co.
Whitin Machine Works.

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(See Aprons.)

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Philadelphia Felt Co.

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Wildman Mfg. Co.

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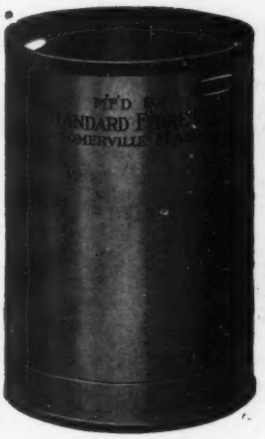

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Blaw-Knox Co.
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CONDUITS.
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Westinghouse Elec. & Mfg. Co.
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Spiker & Lose.
Stuhrman, Edw. A.
Thompson & Binger, Inc.
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Powers Regulator Co.
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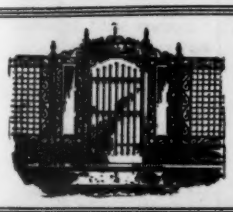

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General Electric Co.

GENERATORS—ELECTRIC.
(See Motors and Generators.)

GLASSWARE AND DISHES.
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GLASS SKYLIGHTS.
Drouve Co., G.

GOVERNORS—PUMP.
General Electric Co.

GRAPHIC CHARTS.
Ernst & Ernst.

GRAPHITE.
Dixon Crucible Co., Jos.

GRATES—BOILER.
Cole Mfg. Co., R. D.
International Eng. Works.
Lombard Fdry. & Mch. Co.
United Mch. & Mfg. Co.
Walsh & Weidner Boiler Co.

GRATES—MECHANICAL.
(See Stokers.)

GREASE.
(See Lubricants.)

GREASE CUPS.
(See Lubricators.)

GRINDERS—CARD, CYLINDER, ROLL, NAPPER AND GARNET.
(See Card Grinding Machinery)

GUARDS—ELECTRIC LAMP.
(See Electric Lamp Guards.)

GUARDS—MACHINE, SKYLIGHT, WINDOW, ETC.
Knapp Fence Co.

GUIDES—THREAD.
Foster Machine Co.
Palmer Co., I. E.

GUIDER—CLOTH-ELECTRIC.
Blake Electric Mfg. Co.

GUIDER (TENSION).
Foster Machine Co.

GUMS.
(See Finishing and Sizing Materials.)

HANGERS.
(See Shafting and Hangers.)

HARDWARE—BUILDING.
Sanymetal Products Co.

HARNESS—LOOM.
American Supply Co.
Atlanta Harness & Reed Mfg. Co.
Crompton & Knowles Loom Works.
Emmons Loom Harness Co.
Greist Mfg. Co.
Garland Mfg. Co.

HEADS—BOBBIN AND SPOOL.
Lestershire Spool & Mfg. Co.

HEATERS.
Bayley Mfg. Co.

HEATING AND VENTILATING APPARATUS.
(See Ventilating Apparatus.)

HEDDLES.
Crompton & Knowles Loom Works.
Draper Corporation.
Steel Heddle Mfg. Co.
Williams Co., J. H.

HEDDLE FRAMES.
Crompton & Knowles Loom Works.
Hopedale Mfg. Co.
Steel Heddle Mfg. Co.
Williams Co., J. H.

HOISTS.
Chisholm-Moore Mfg. Co.
Curtis Pneumatic Mchry. Co.
Link-Belt Company.
Mason, Volney W.
Morse Chan Co.
Walraven Co.

HOPPER FEEDERS.
(See Automatic Feeders.)

HOSE—FIRE.
Collins, J. D.
Walraven Co.

HOSIERY DYEING MACHINERY.
Cocker Mch. & Fdry. Co.
Cole Mfg. Co., R. D.
Franklin Process Co.

HOSIERY FORMS.
(See Drying Forms.)

HOSIERY YARNS.
(See Yarn Manufacturers.)

HOSPITAL EQUIPMENT AND SUPPLIES.
Estes Surgical Supply Co.

HOTELS.
Hotel Cecil.
Hotel Claridge.
Hotel Martinique.
Hotel Sinton.
Hotel Tuller.

HOUSES—STEEL.
Blaw-Knox Co.

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American Moistening Co.
Bayley Mfg. Co.
Carrier Eng. Corp.
Parks-Cramer Co.

HUMIDITY INDICATING INSTRUMENTS.
Powers Regulator Co.

HYDROMETERS.
Taylor Instrument Co.

HYDGRODEIKS.
Taylor Instrument Co.

HYDRAULIC TURBINES.
(See Turbines—Hydraulic.)

HYDRO EXTRACTORS.
(See Extractors.)

ICE MACHINES.
Miles Refrigerating Co.
Southern Ice Machine Co.

ILLUMINATING ENGINEERS.
Curtis, Paul W.
Huntington & Guerry.
Ivanhoe-Regent Works.

INDICATING AND RECORDING INSTRUMENTS AND THERMOMETERS.
Foxboro Co., Inc.
General Electric Co.
Powers Regulator Co.
Taylor Instrument Co.

INDIGO.
(See Dyestuffs and Chemicals.)

INDICATORS FOR ROVING CANS.
O'Malley & Carroll.

INDUSTRIAL SITES.
Nashville Industrial Corp.

INJECTORS.
Lunkenheimer Co.

INK—STENCIL AND MARKING.
Atlanta Stamp & Stencil Wks.
Bradley Mfg. Co., A. J.

IRON WORK—ORNAMENTAL.
Anchor Post Iron Works.
Chicago Bridge & Iron Wks.
Dufur & Co.
Lombard Iron Works & Supply Co.

JACK SPOOLS.
(See Spools.)

JACQUARDS.
Crompton & Knowles Loom Works.

JOINT COMPOUND.
Dixon Crucible Co., Jos.

JUTE BAGGING MACHINE.
Smith & Furbush Machine Co.

KETTLES—SIZE.
(See Size Kettles.)

KETTLES—SODA.
Chicago Bridge & Iron Wks.
Lombard Iron Works & Supply Co.

KIERS.
(See Bleaching Kiers.)

KNIT GOODS.
(See Cotton Cloth Commission Merchants and Dealers.)

KNIT GOODS WASHERS.
(See Washers—Cloth.)

KNITTING MACHINERY AND SUPPLIES.
Brinton Co., H.
General Machine Works.
Hemphill Mfg. Co.
Scott & Williams.
Trump Bros. Machine Co.
Wildman Mfg. Co.

LABORATORY INSTRUMENTS AND THERMOMETERS.
Estes Surgical Supply Co.
Taylor Instrument Co.

LACING—BELT.
(See Belt Lacing.)

LAMPS—INCANDESCENT AND ARC.
Bryan Electric Co.
Carter Electric Co.
Curtis, Paul W.
Cutter Works, George.
General Electric Co.
Ivanhoe-Regent Works of G. E. Co.
Walraven Co.
Westinghouse Elec. & Mfg. Co.

LAMP GUARDS—KEY LOCKING.
(See Electric Lamp Guards.)

LAMP REFLECTORS.
Bryan Electric Co.
Carter Electric Co.
Curtis, Paul W.
Cutter Works, George.
Ivanhoe-Regent Works of G. E. Co.
Westinghouse Elec. & Mfg. Co.

LANDSCAPE ARCHITECTS.
(See Village Architects.)

LAPPERS.
Brooks & Doxey, Ltd.
Lord Bros.
Saco-Lowell Shops.
Smith & Furbush Mch. Co.
Whitin Machine Works.

LAUNDRY MACHINERY.
American Laundry Mchry. Co.
Fletcher Works.
Hunt Machine Co., Rodney.
Schaum & Uhlinger.
Tolhurst Machine Works.

LAVATORIES.
Crane Co.
Vogel Co., Jos. A.

LEATHER BELTING.
(See Belting.)

LEATHER SPECIALTIES.
American Supply Co.
Bond Co., Chas.
Williams & Sons, I. B.

LIGHTS—FLOOD.
Cutter Works, George.
General Electric Co.
Ivanhoe-Regent Works.
Westinghouse Elec. & Mfg. Co.

LIGHTING ENGINEERS AND CONTRACTORS.
(See Illuminating Engineers.)

LINEN YARNS.
(See Yarns—Linen.)

LINK BELTING.
(See Belting—Link.)

LINTERS.
(See Waste Dealers.)

LIQUID CHLORINE.
(See Chlorine.)

LOADERS—WAGON AND TRUCK.
Link-Belt Company.

LOCKERS—METAL.
Collins, J. D.
Lupton Sons Co., David.
Sanymetal Products Co.

LOGWOOD EXTRACT.
(See Dyestuffs and Chemicals.)

LOOMS.
Crompton & Knowles Loom Works.
Draper Corporation.
Fletcher Works.
Hopedale Mfg. Co.
Saco-Lowell Shops.
Schaum & Uhlinger.
Stafford Co.

LOOM ATTACHMENTS—AUTOMATIC.
Clayton & Bentley Co.
Draper Corporation.
Hopedale Mfg. Co.

LOOM HARNESS.
(See Harness.)

LUBRICANTS.
D-A Lubricant Co.
Dixon Crucible Co., Jos.
Masury-Young Co.
Moore Oil Refining Co.
N. Y. & N. J. Lubricant Co.
Swan & Finch Co.

LUBRICATORS.
Bowser & Co., S. F.
Lidseen.
Lunkenheimer Co.
N. Y. & N. J. Lubricant Co.

LUG STRAPS.
(See Straps—Lug.)

LUMBER.
Cornell Wood Products Co.
Southern Cypress Mfg. Asso.
Southern Wood Preserving Co.

LUNCH ROOM EQUIPMENT.
(See Restaurant.)

MACHINE TOOLS.
(See Tools.)

MACHINISTS.
Briggs-Shaffner Co.
Cole Mfg. Co., R. D.
Cresson-Morris Co.
Lombard Fdry. & Mch. Works.

MARKING POTS, STENCILS, INKS, ETC.
Atlanta Stamp & Stencil Wks.
Bradley Mfg. Co., A. J.

MERCERIZED YARNS.
(See Yarn Manufacturers).

MERCERIZERS.
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Amer. Yarn & Processing Co.
Boger & Crawford.
Dixie Mercerizing Co.
United Piece Dye Wks.

MERCERIZED YARN.
Aberfoyle Mfg. Co.
American Yarn & Pro. Co.
Boger & Crawford Co.
Dixie Mercerizing Co.
Hunter Mfg. & Comm. Co.
Pacific Mills.

MERCERIZING MACHINERY.
Butterworth, H. W. & Sons Co.
Textile Finishing Machinery Co.

METAL CEILINGS, ETC.
Lupton's Sons Co., David.

METALS—PERFORATED.
(See Screens and Sieves.)

METERS—FLOW, AIR, GAS, ELECTRIC, STEAM, ETC.
Allis-Chalmers Mfg. Co.
Bryan Electric Co.
Carter Electric Co.
Foxboro Co., Inc.
General Electric Co.
Lunkenheimer Co.
Westinghouse Elec. & Mfg. Co.

METERS—COUNTING.
(See Counters.)

MILL BASKETS AND BOXES.
(See Boxes—Mill.)

MILL ENGINEER.
(See Architects and Engineers.)

MILL VILLAGES.
(See Villages.)

MILL SUPPLIES—MISCELLANEOUS.
(See Supplies—Mill.)

MILL WHITE PAINT.
(See Paint.)

MOPS.
Atanta Brush Co.
Harris Broom Co.
Southwestern Broom Mfg. Co.

MOTION PICTURES.
(See Films.)

MOTORS AND GENERATORS—ELECTRIC.
Allis-Chalmers Mfg. Co.
Bryan Electric Co.
Carter Electric Co.
Curtis, Paul W.
General Electric Co.
Nashville Industrial Corp.
Walraven Co., The.
Westinghouse Elec. & Mfg. Co.

MUSICAL INSTRUMENTS AND SUPPLIES.
Cable Piano Co.

MOVING PICTURE MCH. AND SUPPLIES.
(See Theatre Equipment or Films).

NAPPERS.
Roy & Son Co., B. S.

OFFICE PARTITIONS.
Lupton's Sons Co., David.
Sanymetal Products Co.

OIL—LUBRICATING.
D-A Lubricant Co.
Johnson & Co., Inc., Oliver.
Masury-Young Co.
Moore Oil Refining Co.
Wadsworth, Howland & Co., Inc.

OIL FILTERS.
Burt Mfg. Co.

OILS—FINISHING.
(See Finishing and Sizing Materials.)

OIL CANS.
Lidseen.

OIL CUPS.
(See Lubricators.)

OIL PAPER.
Bradley Mfg. Co., A. J.

OIL STORAGE TANKS AND PUMPS.
Bowser & Co., S. F.

OILING DEVICES.
(See Lubricators.)

OPENERS FOR COTTON, WOOL, WASTE, ETC.
Brooks & Doxey, Ltd.
Lord Bros.
Saco-Lowell Shops.
Schofield Co., Wm.
Smith & Furbush Mach. Co.
Whitin Machine Works.

OVERHEAD CARRIERS.
Chisholm-Moore Mfg. Co.
Curtis Pneumatic Mchry. Co.

OXIDIZING MACHINERY.
Cocker Mch. & Fdry. Co.
Phila. Drying Machinery Co.

OXYGEN.
Bird-Potts Co., Inc.
Commercial Acetylene Supply Co.
Oxweld Acetylene Co.
Standard Gas Products Co.

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Hauser-Stander Tank Co.
Hightower Box & Tank Co.
Lewis Co., G. B.
Walke Box Co., Inc.

PACKINGS.
Jenkins Bros.
Walraven Co.

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American Roofing & Paint Co.
Barrett Co., The.
Dixon Crucible Co., Jos.
Du Pont de Nemours & Co., E. I.
Johnson & Co., Oliver.
Wadsworth, Howland & Co., Inc.

PAINTING CONTRACTORS.
(See Contractors.)

PANEL BOARDS.
(See Switchboards.)

PAPER.
Bradley Mfg. Co., A. J.

PERBORATE OF SODA (SOLOZONE).
Roessler & Hasslacher Chemical Co.

PARTITIONS—STEEL AND WIRE.
Knapp Fence Co.
Lupton's Sons Co., David.
Sanymetal Products Co.

PERFORATED METAL.
(See Screens and Sieves.)

PEROXIDES.
Roessler & Hasslacher Chemical Co.

PIANO & PLAYERS.
Cable Piano Co.

PICKERS—CURLED HAIR.
Schofield Co., Wm.
Smith & Furbush Machine Co.

PICKERS—LEATHER.
Bond Co., Chas.
Garland Mfg. Co.

PICKER STICKS.
Garland Mfg. Co.
Southern Bending Co.
Shambow Shuttle Co.
Walraven Co.
Walraven Co.

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Howard & Bullough Am. Machine Co.
Lord Bros.
Saco-Lowell Shops.
Schofield Co., Wm.
Smith & Furbush Mach. Co.
Whitin Machine Works.

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Scaife & Sons Co., Wm. B.
Walraven Co.

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Dixie Culvert & Metal Co.

PIPE JOINT COMPOUND.
Dixon Crucible Co., Jos.

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Walraven Co., The.

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Crane Co.
Rundle-Spence Mfg. Co.
Taylor, Halsey W.

PNEUMATIC MACHINERY & TOOLS.
Curtis Pneumatic Mchry. Co.

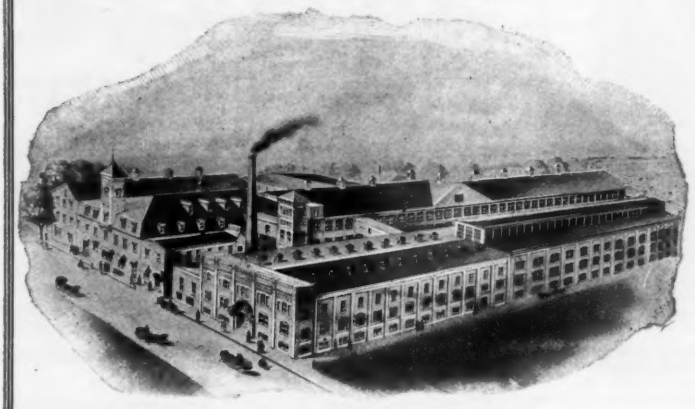
PORTABLE CONVEYORS.
(See Conveyor.)

POSTS—FENCE (WOOD).
Southern Wood Preserving Co.

POWER—ELECTRIC.
Georgia Ry. & Power Co.

POWER TRANSMISSION.
Aldrich Machine Works.
Allis-Chalmers Mfg. Co.
Bond Co., Chas.
Brown Co., A. & F.
Carlyle-Johnson Mch. Co.
Columbia Novelty Mfg. Co.
Cresson-Morris Co.
Dixon Crucible Co., Jos.
Fabreeka Belting Co.
Fafnir Bearing Co.
Flexible Steel Lacing Co.
General Electric Co.
Hyatt Roller Bearing Co.
Link-Belt Company.
Morse Chain Co.
Skayef Ball Bearing Co.
U. S. Ball Bearing Co.
Walraven Co., The.
Westinghouse Elec. & Mfg. Co.
Williams & Sons, I. B.
Wood's Sons Co., T. B.

PRESERVATIVE PAINT FOR METAL WORK.
(See Paints.)



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Perfect Lubrication Without Waste

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"Our Success Represents Confidence Won by Integrity."

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GEORGE F. BAHAN, Southern Representative

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PRESSES.
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Butterworth & Sons Co., H. W.
Economy Baler Co.
Famous Mfg. Co.
Phila. Drying Mch. Co.
Proctor & Schwartz, Inc.
Reliance Machine Works.
Smith & Furbush Mach. Co.
Textile Finishing Machinery Co., The.

PRESSURE REGULATORS.
(See Regulators—Pressure.)

PRINTING.
Byrd Printing Co.
Dowman Wilkins Printing Co.
Showalter Printing Co., A. J.

PULLEYS.
Brown Co., A. & F.
Cole Mfg. Co., R. D.
Dodge Sales & Eng. Co.
Cresson-Morris Co.
Link-Belt Company.
Mason, Volney W.
Walraven Co., The.
Wood's Sons Co., T. B.

PULLEY COVERING.
Williams & Sons, I. B.

PUMPS.
Allis-Chalmers Mfg. Co.
Bowser & Co., S. F.
Goulds Mfg. Co.
Sydnor Pump & Well Co., Inc.
Toomey, Frank.
U. S. & Cuban Allied Works, Eng'g Corp.
Walraven Co.
Walsh & Weidner Boiler Co., The.
Westinghouse Elec. & Mfg. Co.

PUMPS—OIL.
Bowser & Co., S. F.
Lunkenheimer Co.

PUMP VALVES.
(See Valve Discs.)

PYROMETERS.
Taylor Instrument Co.

QUILLS.
U. S. Bobbin & Shuttle Co.

QUILL CLEANING MACHINES.
Terrell Machine Co.

RAILWAYS.
Central of Georgia Railroad.
Southern Railway System.

RECEPTACLES—FIBRE.
(See Fibre Products.)

RECORDING INSTRUMENTS.
Foxboro Co., Inc.
General Electric Co.
Powers Regulator Co.
Taylor Instrument Co.

REEDS.
American Supply Co.
Atlanta Harness & Reed Mfg. Co.
Emmons Loom Harness Co.
Shambow Shuttle Co.
Walraven Co.

REELS.
Cocker Mch. & Fdry. Co.
Crompton & Knowes Loom Works.
Draper Corporation.
Gallaudet Aircraft Corporation.
Hunt Machine Co.
Mossberg Pressed Steel Co.
Saco-Lowell Shops.
Schofield Co., Wm.
Whitin Machine Works.

REFLECTORS—LAMP.
(See Lamp Reflectors.)

REGULATORS—LIQUID LEVEL.
Foxboro Co., Inc.
General Electric Co.
Powers Regulator Co.

REGULATORS—PRESSURE.
Foxboro Co., Inc.
General Electric Co.
Powers Regulator Co.
Taylor Instrument Co.

REGULATORS—TEMPERATURE.
(See Temperature Controllers.)

REINFORCING SLAG.
Birmingham Slag Co.

REPAIRING—ELECTRICAL.
Briggs-Shaffner Co.
Bryan Electric Co.
Curtis, Paul W.
Westinghouse Elec. & Mfg. Co.

REPAIRING—TEXTILE MACHINERY, ETC.
Bird-Potts Co., Inc.
Briggs-Shaffner Co.
General Machine Works.
Southern Spindle & Flyer Co.
Standard Gas Products Co.

RESTAURANT EQUIPMENT.
Sanymetal Products Co.

RIBBERS.
(See Knitting Machinery.)

RIB TOP CUTTERS.
General Machine Works.
Wildman Mfg. Co.

RING TRAVELERS—STEEL AND BRONZE.
Whitinsville Spinning Ring Co.
Whitin Machine Works.

RINGS—SPINNING.
(See Spinning Rings.)

ROCKER SHAFT BEARINGS.
(See Bearings.)

ROLLS—CALENDER.
Brooks & Doxey, Ltd.
Butterworth & Sons Co., H. W.
Lord Bros.
Roy & Son Co., B. S.
Textile Finishing Mchry. Co.
U. S. Bobbin & Shuttle Co.

ROLLS—RUBBER COVERED.
Butterworth & Sons Co., H. W.
Textile Finishing Mchry. Co.
U. S. Bobbin & Shuttle Co.

ROLLS—STEEL.
Brooks & Doxey, Ltd.
Butterworth & Sons Co., H. W.
Lord Bros.
Southern Spindle & Flyer Co.
Textile Finishing Mchry. Co.
U. S. Bobbin & Shuttle Co.

ROLLER CLOTH.
Philadelphia Felt Co.

ROLLER LEATHER.
Bond & Co., Chas.

ROOFING.
Barrett Co., The.
Cortright Metal Roofing Co.
Southern Wood Preserving Co.
Wadsworth, Howland & Co.
Walraven Co.

ROOF AND CEMENT COATING.
American Cement Paint Co.
Barrett Co.
Du Pont de Nemours & Co., E. I.
Johnson & Co., Inc., Oliver.
Wadsworth, Howland & Co.

ROPE—TRANSMISSION.
Allis-Chalmers Mfg. Co.
Brown Co., A. & F.
Cresson-Morris Co.
Link-Belt Company.
Walraven Co.

ROPE SHEAVES.
Brown Co., A. & F.

ROVING CANS.
(See Cans—Roving.)

ROVING CAN INDICATORS.
O'Malley & Carroll.

ROVING MACHINERY.
Brooks & Doxey, Ltd.
Howard & Bullough.
Lord Bros.
Saco-Lowell Shops.
Whitin Machine Works.

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Estes Surgical Supply Co.

RUBBER STAMPS.
(See Stamps, Stencils, Etc.)

SALAMANDERS.
Drouve Co., G.

SANITARY PRODUCTS.
Crane Co.
Dixie Culvert & Metal Co.
Estes Surgical Supply Co.
Rundle-Spence Mfg. Co.
Sanitas Co.
Sanymetal Products Co.
Taylor, Halsey W.
Vogel Co., Jos. A.

SASH-WINDOW—STEEL.
Drouve Co., G.
Lupton's Sons Co., David.
Sanymetal Products Co.

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Drouve Co., G.

SCALE PREVENTER—BOILER.
(See Boiler Feed Water Purification.)

SCREENS—MOVING PICTURE.
Southern Theatre Equip. Co.

SCREENS AND SIEVES—PERFORATED.
Allis-Chalmers Mfg. Co.
Erdle Perforating Co.
Link-Belt Company.

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(See Washers—Cloth.)

SCRUBBING MACHINE—FLOOR.
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Mathieson Alkali Works.
Warren Soap Mfg. Co.

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Lord Bros.
Whitin Machine Works.

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Bryan Electric Co.
Nashville Industrial Corp.
Toomey, Frank, Inc.
Walraven Co.

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(See Harness.)

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Merrow Machine Co., The.
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Cortright Metal Roofing Co.

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Southern Wood Preserving Co.

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Bradley Mfg. Co., A. J.
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Hightower Box & Tank Co.
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Draper Corporation.
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Phila. Drying Machine Co.
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(See Industrial Sites.)

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Saco-Lowell Shops.
Textile Finishing Machinery Co., The.

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(See Finishing and Sizing Materials.)

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Birmingham Slag Co.

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Cole Mfg. Co., R. D.
Howard & Bullough.
Pickens Slasher Hood Co., R. O.
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Textile Finishing Machinery Co., The.

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Philadelphia Felt Co.

SLASHER HOODS.
Cole Mfg Co., R. D.
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(See Tape—Slasher.)

SLATE ASPHALT ROOFING.
Barrett Co.

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Lupton's Sons Co., David.
Sanymetal Products Co.

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Howard & Bullough.
Lord Bros.
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Whitin Machine Works.

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Borne, Scrymser Co.
Ciba Co., Inc.
Du Pont de Nemours & Co., E. I.
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Kali Mfg. Co.
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Sonneborn Sons, Inc., L.
Stearns, Wm. Taylor.
United Chemical Products Corp.
Warren Soap Mfg. Co.
Wolf & Co., Jacques.

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Mathieson Alkali Works, Inc.
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SOFTENERS—WATER.
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SOLDERLESS CONNECTORS—FRANKEL.
Westinghouse Elec. & Mfg. Co.

SOLVENTS.
(See Finishing.)

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U. S. Bobbin & Shuttle Co.

SPEEDOMETERS.
(See Counters.)

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Crown Mfg. Co.
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Gray Mfg. Co.
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Gallaudet Aircraft Corporation.

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(See Tanks, Towers, Etc.)

STARCH AND GUMS.
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(See Hose—Fire.)

STEAM PUMPS.
(See Pumps—Steam.)

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(See Traps—Steam.)

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(See Leather Specialties or Check Straps.)

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Foster Machine Co.
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Collins, J. D.

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Vogel Co., Jos. A.

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Lupton's Sons Co., David.

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Walraven Co., The.

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(See Tanks.)

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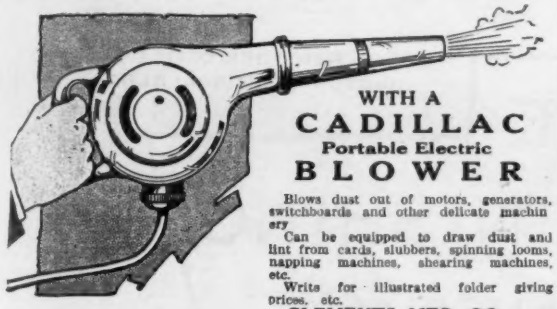

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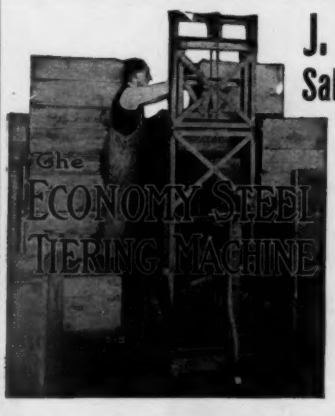

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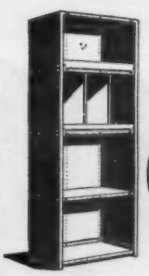

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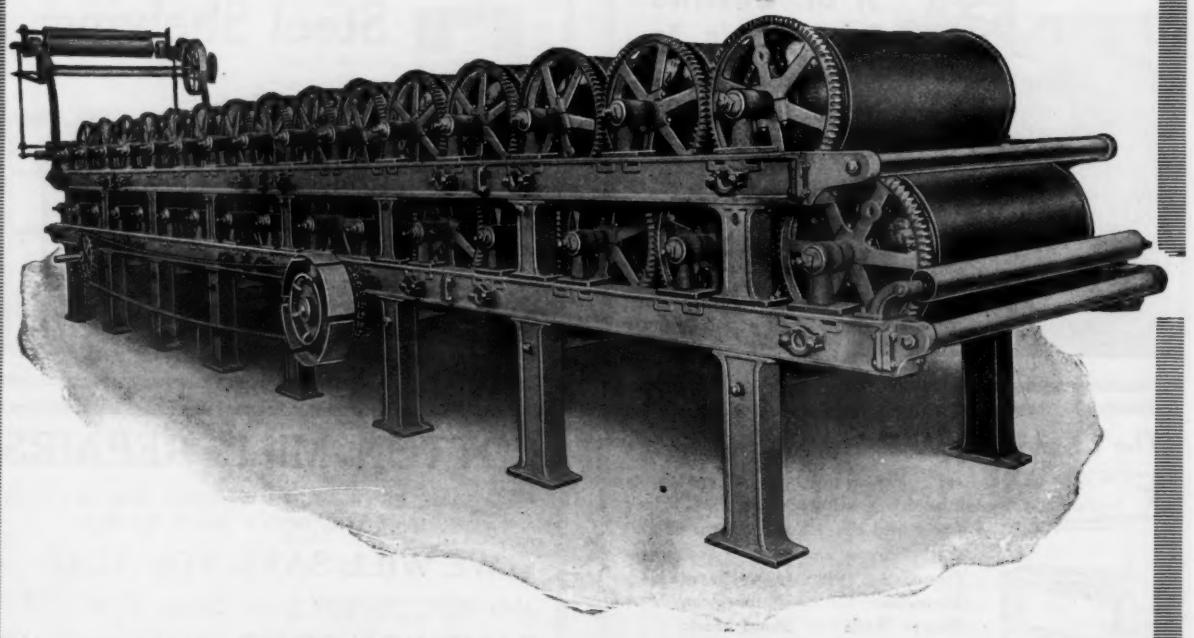

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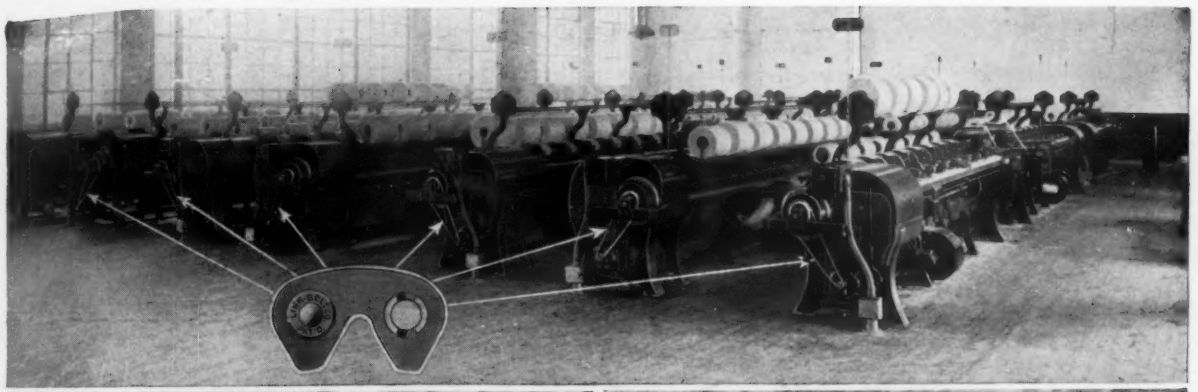

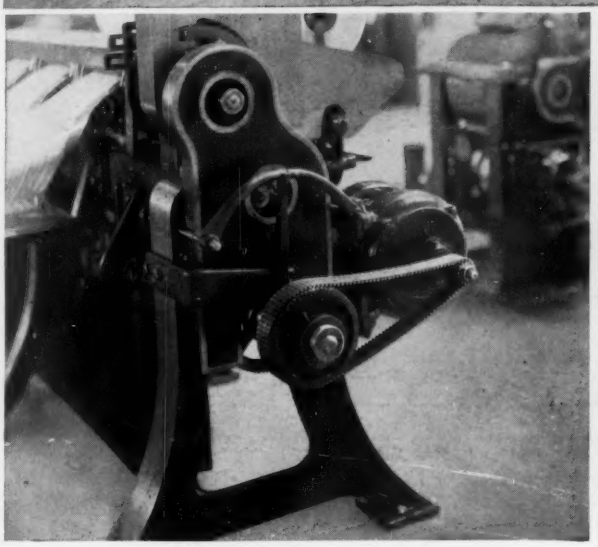

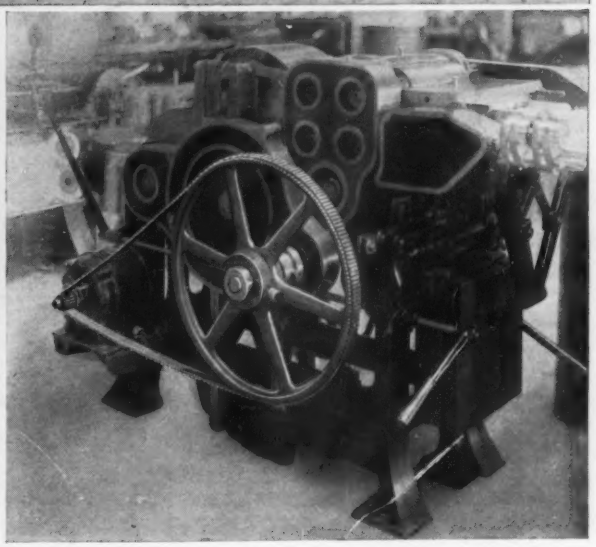

Top—Drives on combers Below—Applications to ribbon lap machine (left) and sliver lap machine, (right)

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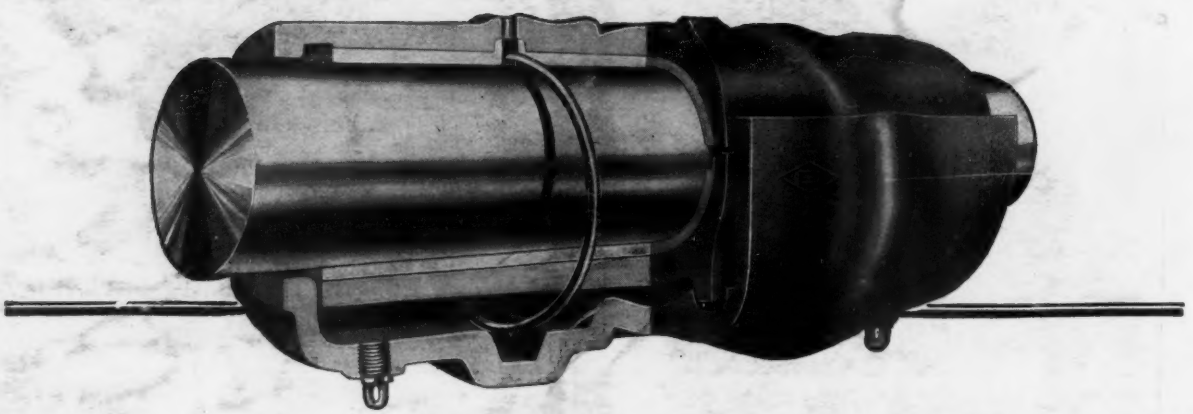

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